



# PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL

U.S. ARMY  
MATERIEL COMMAND

— COMMITTED TO PROTECTION OF THE ENVIRONMENT —

ANIZATION NAME(S) AND ADDRESS(ES)

8.

CONSULTANTS

MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10

ARSENAL (CO.). PMRMA  
CO

## DISTRIBUTION STATEMENT

Approved for public release  
Distribution Unlimited

42

## Woodward-Clyde Consultants



Consulting Engineers, Geologists and Environmental Scientists  
Stanford Place 3, Suite 1000  
4582 South Ulster Street Parkway  
Denver, Colorado 80237  
(303) 694-2770

REQUESTS FOR COPIES OF THIS DOCUMENT  
SHOULD BE REFERRED TO THE PROGRAM MANAGER  
FOR THE ROCKY MOUNTAIN ARSENAL CONTAMINATION CLEANUP,  
AMXRM-PM COMMERCE CITY, CO 80022.

19960719 084

Rocky Mountain Arsenal  
Information Center  
Commerce City, Colorado

| REPORT DOCUMENTATION PAGE  |  |  | Form Approved<br>OMB No. 0704-0188                       |   |
|--|--|--|--|---|
| Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.   |  |  |  |   |
| 1. AGENCY USE ONLY (Leave blank)   |  | 2. REPORT DATE<br>05/00/90               |  | 3. REPORT TYPE AND DATES COVERED        |
| 4. TITLE AND SUBTITLE<br>FINAL DECISION DOCUMENT FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID TREATMENT, ROCKY MOUNTAIN ARSENAL, VERSION 3.2  |  |  | 5. FUNDING NUMBERS                                       |   |
| 6. AUTHOR(S)   |  |  | DAAA15 88 D 0022   |   |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br><br>WOODWARD-CLYDE CONSULTANTS<br>DENVER, CO   |  |  | 8. PERFORMING ORGANIZATION REPORT NUMBER<br><br>90142R03 |   |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)<br><br>ROCKY MOUNTAIN ARSENAL (CO.). PMRMA<br>COMMERCE CITY, CO  |  |  | 10. SPONSORING/MONITORING AGENCY REPORT NUMBER           |   |
| 11. SUPPLEMENTARY NOTES  |  |  |  |   |
| 12a. DISTRIBUTION/AVAILABILITY STATEMENT<br><br>APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED   |  |  | 12b. DISTRIBUTION CODE                                   |   |
| 13. ABSTRACT (Maximum 200 words)<br><br>THE OBJECTIVES OF THE INTERIM RESPONSE ACTION FOR THE REMEDIATION OF BASIN F LIQUID ARE TO:<br>1. SELECT THE FINAL TREATMENT PROCESS<br>2. CONDUCT PREDESIGN TESTING AT T-THERMAL'S EXISTING SUBMERGED QUENCH INCINERATION FACILITY AT CONSHOHCKEN, PA<br>3. DEVELOP AN ENGINEERING DESIGN PACKAGE FOR THE SELECTED TREATMENT PROCESS<br>4. CONSTRUCT THE NECESSARY FACILITY.<br>THIS FINAL DECISION DOCUMENT PROVIDES SUMMARIES OF:<br>1. ALTERNATIVES CONSIDERED<br>2. SIGNIFICANT EVENTS LEADING TO THE INITIATION OF THE IRA<br>3. THE IRA PROJECT<br>4. THE COMMUNITY INVOLVEMENT PROGRAM<br>5. THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, STANDARDS, CRITERIA, AND LIMITATIONS (ARAR'S) ASSOCIATED WITH THE PROGRAM. |  |  |  |   |
| 14. SUBJECT TERMS<br><br>ARARS, INCINERATION, IRA F  |  |  | 15. NUMBER OF PAGES                                      |   |
|  |  |  | 16. PRICE CODE   |   |
| 17. SECURITY CLASSIFICATION OF REPORT<br><br>UNCLASSIFIED  |  | 18. SECURITY CLASSIFICATION OF THIS PAGE |  | 19. SECURITY CLASSIFICATION OF ABSTRACT |
| 20. LIMITATION OF ABSTRACT   |  |  |  |   |

VOLUME II - APPENDIX A  
  
FINAL DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION  
BASIN F LIQUID TREATMENT  
ROCKY MOUNTAIN ARSENAL  
MAY 1990  
CONTRACT NO. DAAA15-88-D-0022/0001  
VERSION 3.2

Prepared by:

WOODWARD-CLYDE CONSULTANTS

Prepared for:

U.S. ARMY PROGRAM MANAGER'S OFFICE  
FOR ROCKY MOUNTAIN ARSENAL CONTAMINATION CLEANUP

The use of trade names in this report does not constitute an official endorsement or approval of the use of such commercial products. The report may not be cited for purposes of advertisement

22206 (22206r5Ts 05-01-90) (RMB)

DTIC QUALITY INSPECTED 4

Rocky Mountain Arsenal  
Information Center  
Commerce City, Colorado

TABLE OF CONTENTS

|  | <u>Page</u> |
|--|-------------|
| EXECUTIVE SUMMARY  | ES-1        |
| 1.0 INTRODUCTION   | 1-1         |
| 2.0 HISTORY OF BASIN F LIQUID INTERIM RESPONSE ACTION              | 2-1         |
| 3.0 INTERIM RESPONSE ACTION OBJECTIVES                             | 3-1         |
| 4.0 INTERIM RESPONSE ACTION ALTERNATIVES                           | 4-1         |
| 4.1 REVIEW OF ALTERNATIVES   | 4-1         |
| 4.1.1 Off-Site Alternatives  | 4-2         |
| 4.1.2 On-Site Alternatives   | 4-6         |
| 4.1.3 Conclusions  | 4-12        |
| 4.2 TREATMENT ASSESSMENT STUDY                                     | 4-14        |
| 4.2.1 Waste Characterization                                       | 4-14        |
| 4.2.2 Screening of Technologies and Development<br>of Alternatives | 4-15        |
| 4.2.3 Treatability Studies   | 4-17        |
| 4.2.4 Detailed Evaluation of Alternatives                          | 4-18        |
| 4.2.5 Selection of a Preferred Alternative                         | 4-18        |
| 5.0 CHRONOLOGY OF EVENTS   | 5-1         |
| 6.0 SUMMARY OF THE INTERIM RESPONSE ACTION                         | 6-1         |
| 6.1 THE TREATMENT FACILITY   | 6-3         |
| 6.2 IMPLEMENTATION AND OPERATION OBJECTIVES                        | 6-5         |
| 6.3 HEALTH AND SAFETY PLAN   | 6-9         |
| 7.0 IRA PROCESS  | 7-1         |
| 8.0 COMMUNITY RELATIONS PROGRAM                                    | 8-1         |
| 9.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)    | 9-1         |
| 9.1 INTRODUCTION   | 9-1         |
| 9.2 AMBIENT OR CHEMICAL-SPECIFIC ARARs                             | 9-1         |
| 9.2.1 Air Emissions  | 9-2         |
| 9.2.2 Standard Setting Process For Air Emissions                   | 9-5         |
| 9.3 LOCATION-SPECIFIC ARARs  | 9-8         |

TABLE OF CONTENTS (Continued)

|  | <u>Page</u> |
|--|-------------|
| 9.4 ACTION-SPECIFIC ARARs                              | 9-9         |
| 9.4.1 Description                                      | 9-9         |
| 9.4.2 Construction of Treatment System                 | 9-9         |
| 9.4.3 General Construction Activities                  | 9-11        |
| 9.4.4 Wetlands Implications                            | 9-14        |
| 9.4.5 Land Disposal Restrictions and Removal of Soil   | 9-15        |
| 9.4.6 System Operations                                | 9-16        |
| 9.4.7 Removal of Tanks and Ponds                       | 9-19        |
| 9.5 COMPLIANCE WITH THE OTHER ENVIRONMENTAL LAWS       | 9-19        |
| 10.0 SCHEDULE  | 10-1        |
| 11.0 CONSISTENCY OF IRA WITH THE FINAL REMEDIAL ACTION | 11-1        |
| 12.0 REFERENCES  | 12-1        |

LIST OF TABLES

TABLE 8-1 - EXPRESSED CONCERNS AND FORM OF RESPONSE

LIST OF FIGURES

FIGURE 2-1 MAP OF RMA AND DENVER VICINITY  
FIGURE 2-1 HISTORIC MAP OF RMA SHOWING SITES OF FORMER  
EVAPORATIVE BASINS  
FIGURE 6-1 CONCEPTUAL DRAWING OF SUBMERGED QUENCH INCINERATION WITH  
SPRAY DRYING

LIST OF APPENDICES

APPENDIX A - COMMENTS AND RESPONSES

APPENDIX A  
COMMENTS AND RESPONSES

---

APPENDIX A  
TABLE OF CONTENTS

|   | <u>Page</u> |
|---|-------------|
| A.1 U.S. EPA - COMMENTS AND RESPONSES   | A.1-1       |
| A.1.1 U.S. EPA Cover Letter   | A.1-1       |
| A.1.2 Cover Letter - Comments and Response                                      | A.1-5       |
| A.1.3 Specific Comments and Response  | A.1-9       |
| A.1.4 U.S. EPA Comments on Draft ARARs and Response                             | A.1-26      |
| A.2 State of Colorado - COMMENTS AND RESPONSE                                   | A.2-1       |
| A.2.1 State of Colorado Cover Letter  | A.2-2       |
| A.2.2 Cover Letter - Comments and Response                                      | A.2-4       |
| A.2.3 Specific Comments and Response  | A.2-6       |
| A.2.4 State Comments on Draft ARARs and Response                                | A.2-27      |
| A.3 Tri-County Health Dept. - COMMENTS AND RESPONSE                             | A.3-1       |
| A.3.1 Letter  | A.3-2       |
| A.3.2 Response to Comments in Letter  | A.3-4       |
| A.4 U.S. Dept. of Interior/Fish and Wildlife Service -<br>COMMENTS AND RESPONSE | A.4-1       |
| A.4.1 Letter  | A.4-2       |
| A.4.2 Response to General Comments in Letter                                    | A.4-3       |
| A.5 Shell Oil Company - COMMENTS AND RESPONSE                                   | A.5-1       |
| A.5.1 Shell Oil Co. Cover Letter  | A.5-2       |
| A.5.2 General and Specific Comments and Response                                | A.5-3       |
| A.5.3 Holme, Roberts and Owen Letter on Draft ARARs                             | A.5-14      |
| A.5.4 Comments on Draft ARARs and Response                                      | A.5-17      |
| A.6 National Toxics Campaign - COMMENTS AND RESPONSE                            | A.6-1       |
| A.6.1 National Toxics Campaign Cover Letter                                     | A.6-2       |
| A.6.2 Comments and Response   | A.6-3       |
| A.7 League of Women Voters - COMMENTS AND RESPONSE                              | A.7-1       |
| A.7.1 Letter  | A.7-2       |
| A.7.2 Comments and Response   | A.7-4       |

|        |  |        |
|--------|--|--------|
| A.8    | Clara Lou Humphrey - COMMENTS AND RESPONSE                                     | A.8-1  |
| A.8.1  | Letter   | A.8-2  |
| A.8.2  | Comments and Response  | A.8-5  |
| A.9    | Carolyn G. Hicks - COMMENTS AND RESPONSE                                       | A.9-1  |
| A.9.1  | Letter   | A.9-2  |
| A.9.2  | Comments and Response  | A.9-4  |
| A.10   | Randy Keough, General Counsel, Vittrification Tech. -<br>COMMENTS AND RESPONSE | A.10-1 |
| A.10.1 | Letter from Randy Keough   | A.10-2 |
| A.10.2 | Response to Letter   | A.10-4 |
| A.11   | Hanna R. Schulewski - COMMENTS AND RESPONSE                                    | A.11-1 |
| A.11.1 | Letter from Hanna R. Schulewski  | A.11-2 |
| A.11.2 | Response to Letter   | A.11-3 |



APPENDIX A.1  
U.S. EPA - COMMENTS AND RESPONSES

---

A.1-1



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII

999 18th STREET - SUITE 500  
DENVER, COLORADO 80202-2405

JAN 29 1990

*Recd.  
1-31-90  
11:41 AM  
CR*

Ref: 8HWM-FF

Donald Campbell  
Office of the Program Manager  
ATTN: AMXMR-PM  
Rocky Mountain Arsenal  
Commerce City, Colorado 80022-2180

Re: Rocky Mountain Arsenal (RMA),  
Basin F Liquids Interim Response  
Action (IRA), Final Treatment Assessment  
Report (TAR) and Proposed Decision  
Document, December 1989

Dear Mr. Campbell:

EPA endorses the proposed selection of submerged quench incineration (SQI) for destruction of the Basin F liquids. We do so after careful consideration of many technical and legal concerns and of the public's comments. We agree that the SQI alternative best meets the selection criteria of CERCLA and the FFA, and intend to select it via endorsement of an acceptable Final Decision Document for the IRA. We look forward to continued progress on this significant environmental contamination remedy, in a cooperative effort among the Army, EPA, the State of Colorado, and Shell Oil Company.

Such progress, however, will likely be neither easy to achieve nor routine. Continued strong efforts to involve the public are very important. Careful oversight by EPA and the State will be necessary to ensure the proper development of operating, monitoring, and contingency plans, and system design and operation in conformity with the Final Decision Document.

The first step of such progress is development of an acceptable Final Decision Document. EPA has several concerns with the Proposed Decision Document and Final TAR, which are described in the enclosed comments. We ask that you welcome Messrs. John Haggard and Bruce Ray to work closely with your staff to resolve these issues before development of the Final Decision Document.

Highlights of our concerns include:

1) The introduction to the document states that the decision to manage residuals as a brine (liquid) or salt (solid) is an engineering detail that will be included in the implementation document. (That statement is inconsistent with several other parts of the Proposed Decision Document.) We do not agree with that characterization. It is a crucial point that affects the risks associated with SQI and the ultimate disposal location of the residuals. Such a selection of residuals in solid form needs to be specified as part of the Final Decision Document. To do otherwise, the Army would have to conduct an evaluation of technical aspects and potential Applicable or Relevant and Appropriate Requirements (ARARs) for a new separate alternative; the Army would also have to reopen the public review for comment on the new alternative and ARARs. Unless the Army wishes to take those measures, the statement should be deleted from the text.

We have much the same concern regarding the "need for and type of metals recovery process." However, we certainly support the careful evaluation of options for recovery of metals.

2) Likewise, the introduction to the document states that the "standards for selected non-regulated compounds" will be included in the Implementation Document. Rather than such a brief statement on such an important topic, the document should point out the relationship between such standards and the trial burn, and stress the commitment in the Decision Document to a design and operating requirement for no cumulative risk higher than one in one million of excess cancer incidence, or hazard index greater than 1, in the nearest exposed population, whether on or off RMA. (See our comments on ARARs.)

The Proposed Decision Document, page 8-2, indicates that written response to comments will be included as an appendix to the Final Decision Document. We also wish to work closely with your staff on response to such comments before preparation of that final document, to ensure adequate consideration of public comments.

In addition, only on January 24, 1990, did we receive your Draft Public Health Risk Assessment Report, SQI, Task IRA-2, Basin F Liquids Treatment Design, January, 1990. While we understand that report supports the previous risk assessment work, we have not yet had the opportunity to review it. EPA reserves the right to revisit our decision in support of SQI in the event the new report provides new or differing information.

Because EPA has such an important role, we expect to work closely with the Army at each step of the process to develop acceptable designs, monitoring programs, contingency plans, operating requirements, and schedules.

As a final related matter, please also find enclosed:

1) A review from our Office of Research and Development (ORD) of the information provided by the State on Supercritical Water Oxidation. The review points out unaddressed issues (scale-up concerns, the need for testing under field conditions, safety concerns for both operators and the public, and concerns over the cost estimates); it shows the optimism behind the cost and development time estimates. Our position remains that, if the technology can be developed to a commercial level, it may be promising for other remedial actions on RMA. However, it is not a feasible alternative for destruction of the Basin F liquids under the current schedule.

2) A further review of the T-Thermal report. It emphasizes the importance of either additional testing or flexibility of design to allow for optimization of critical operating parameters. Further, to assure timely completion of destruction of the wastes, it may be necessary to design for a higher operating rate to cover down times; non-operating periods often extend to 10 to 30 percent of the time. EPA wishes to follow the design of the SQI to assure resolution of such concerns.

Please call me if you wish to discuss this matter.

Sincerely yours,



Connally E. Mears  
EPA Coordinator for RMA Cleanup

enclosures (5)

cc: Glenn Tucker, ATSDR  
Robert Williams, ATSDR  
Col. Daniel Voss, RMA-PMO  
Enge Dressler, RMA-PMO  
Major Larry Rouse, DA  
John Moscato, Department of Justice  
Robert Foster, Department of Justice  
David Shelton, CDH  
Jeff Edson, CDH  
Ellen Mangione, CDH  
Brad Beckham, CDH  
Vicky Peters, Colorado AG's Office  
Chris Hahn, Shell Oil Company  
George Roe, Shell Oil Company  
(all with enclosures)

**RESPONSE TO COMMENTS OF U.S. ENVIRONMENTAL PROTECTION AGENCY  
ON PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID DISPOSAL**

RESPONSE TO COMMENTS IN  
U.S. EPA COVER LETTER OF  
JANUARY 29, 1990

Comment 1: The introduction to the document states that the decision to manage residuals as a brine (liquid) or salt (solid) is an engineering detail that will be included in the implementation document. (That statement is inconsistent with several other parts of the Proposed Decision Document.) We do not agree with that characterization. It is a crucial point that affects the risks associated with SQI and the ultimate disposal location of the residuals. Such a selection of residuals in solid form needs to be specified as part of the Final Decision Document. To do otherwise, the Army would have to conduct an evaluation of technical aspects and potential Applicable or Relevant and Appropriate Requirements (ARARs) for a new separate alternative; the Army would also have to reopen the public review for comment on the new alternative and ARARs. Unless the Army wishes to take those measures, the statement should be deleted from the text.

We have much the same concern regarding the "need for and type of metals recovery process". However, we certainly support the careful evaluation of options for recovery of metals.

Response: The Army agrees that the Treatment Assessment Report and Proposed Decision Document have primarily presented the preferred alternative as SQI with spray drying of

residuals. This concept was further enforced by our flow diagrams and models presented to the public. For these reasons, the Army will revise the Draft Final Decision Document to reflect that residuals will be managed as a salt, i.e., spray drying. The early language in the Proposed Decision Document was intended to allow options other than spray drying to be evaluated in the design phase. The Army still believes that an evaluation of other options is useful from an engineering standpoint, but will not conduct such an evaluation unless technical problems become apparent upon detailed evaluation of the spray-drying approach. If such technical problems surface, the Army will advise the other organizations and the State, prior to proceeding with the evaluation of other options. The Army does not believe that risk and numerical ranking would drastically change as a result of residuals management. (Please refer to the Army's response to Specific Comment 1.)

Comment 2: Likewise, the introduction to the document states that the "standards for selected nonregulated compounds" will be included in the Implementation Document. Rather than such a brief statement on such an important topic, the document should point out the relationship between such standards and the trial burn, and stress the commitment in the Decision Document to a design and operating requirement for no cumulative risk higher than one in one million of excess cancer incidence, or hazard index greater than 1, in the nearest exposed population, whether on or off RMA. (See our comments on ARARs.)

Response: Section 9.0 of the Proposed Decision Document outlines the approach for the development of standards for the nonregulated compounds consistent with the guidelines as

## Woodward-Clyde Consultants

established in 40 CFR Part 270. This standard-setting procedure will be outlined in detail in the Draft Implementation Document. The standards will be finalized when information and data from the full-scale trial burn become available. The standard-setting procedures will be subject to EPA concurrence through review of the Draft Implementation Document, full-scale trial burn plan, and full-scale trial burn report. The Army has stressed the commitment throughout the Proposed Decision Document that the SQI treatment process design and operating requirements will ensure protectiveness of human health and the environment consistent with CERCLA guidelines.

Comment 3: The Proposed Decision Document, page 8-2, indicates that written response to comments will be included as an appendix to the Final Decision Document. We also wish to work closely with your staff on response to such comments before preparation of that final document, to ensure adequate consideration of public comments.

Response: The Army welcomes EPA's involvement and has incorporated EPA input in addressing public concerns as expressed in the citizens' comments and letters received to date.

Comment 4: In addition, only on January 24, 1990, did we receive your Draft Public Health Risk Assessment Report, SQI, Task IRA-2. Basin F Liquids Treatment Design, January, 1990. While we understand that report supports the previous risk assessment work, we have not yet had the opportunity to review it. EPA reserves the right to revisit our decision in support of SQI in the event the new report provides new or differing information.

## Woodward-Clyde Consultants

Because EPA has such an important role, we expect to work closely with the Army at each step of the process to develop acceptable designs, monitoring programs, contingency plans, operating requirements, and schedules.

Response: The Draft Public Health Risk Assessment is part of a later phase of this Interim Response Action, specifically the design phase. As EPA is aware, all technologies evaluated in the Treatment Assessment Report were treated equally in terms of risk assessment. That is to say that a worst-case risk was calculated from process efficiencies and initial Basin F Liquid concentrations. This was appropriate to do at the assessment phase since no selection had occurred. The risk assessment EPA is referring to focuses solely on the selected alternative and correctly belongs after the Decision Document and in the design phase. No change in risk outcome for SQI occurred and, as such, it does not affect the selection in this Decision Document. The Army expects to receive comments on this risk assessment and will address those comments in the Draft Implementation Document.

Comment 5: As a final related matter, please also find enclosed: A review from our Office of Research and Development (ORD) of the information provided by the State on Supercritical Water Oxidation. The review points out unaddressed issues (scale-up concerns, the need for testing under field conditions, safety concerns for both operators and the public, and concerns over the cost estimates); it shows the optimism behind the cost and development time estimates. Our position remains that, if the technology can be developed to a commercial level, it may be promising for other remedial actions on RMA. However, it is not a feasible alternative for destruction of the Basin F liquids under the current schedule.



Response: The Army agrees with EPA on the status of Supercritical Water Oxidation. If the technology can be developed to commercial scale it may be suitable for aqueous streams or liquid wastes from other remedial activities at RMA and would be considered in other technical assessments where appropriate. However, the technology is not sufficiently developed to be available at commercial scale for the Basin F liquids IRA under the current schedule.

Comment 6: A further review of the T-Thermal report. It emphasizes the importance of either additional testing or flexibility of design to allow for optimization of critical operating parameters. Further, to assure timely completion of destruction of the wastes, it may be necessary to design for a higher operating rate to cover down times; nonoperating periods often extend to 10 to 30 percent of the time. EPA wishes to follow the design of the SQI to assure resolution of such concerns.

Response: The Army will consult with EPA throughout the design process. Flexibility of the design and optimization of critical operating parameters will be evaluated during the design phase and addressed in the Draft Implementation Document.

#### SPECIFIC COMMENTS

Comment 1: The introduction on page 1-2 states that the decision to manage residuals as a brine (liquid) or salt (solid) is an engineering detail that will be included in the implementation document but not discussed in the decision document.

We do not agree with characterization of this as an engineering detail. It is a crucial point that needs to be specified as part of the preferred alternative in the Decision Document.

The use of spray drying to produce a solid residual played a crucial part in submerged quench incineration (SQI) receiving high scores in the Treatment Assessment Report (TAR). The elimination of spray drying would significantly change the SQI alternative and its numerical ranking. To do so would require both an evaluation of a separate alternative and reopening the public comment period for the new alternative. Unless the Army wishes to take those measures, the statement should be deleted from the text.

Furthermore, as at least the following notations demonstrate, the statement is inconsistent with many other parts of the Decision Document (DD) where the residuals are referred to as solids:

- Page 4-9, last paragraph, second sentence. The text states, "The submerged quench incineration process would produce salts..."
- Page 4-13, Residuals section, first sentence. The text once again refers to salt (solid) as being the residual from SQI.
- Page 9-1, Section 9.1, last sentence. The text again refers to the residuals as a solid.
- Page 9-2, Section 9.2, last paragraph. The text states "These ARARs are focused on the preferred alternative

for this IRA, submerged quench incineration conducted on-site with off-site disposal of solid residuals."

Thus, the draft decision document, as well as the cost and risk analyses in the TAR, has consistently addressed the residuals from the preferred alternative as solids, except for one contrary reference. Again, the statement in the introduction should be eliminated.

Response: See the response to General Comment 1 in the U.S. EPA cover letter. In principle, the Army agrees with EPA to a decision of residuals management as a salt, i.e., spray drying. The Army, however, does not agree that elimination of spray drying would significantly change the SQI alternative and its numerical ranking. Basically, neither residuals management option changes SQI's Number 1 ranking. To support this claim, the Army performed the numerical ranking with a SQI/brine alternative.

Generally, the new ranking showed SQI with brine to be significantly better in terms of cost and slightly better in terms of technical factors, i.e., reduction of mobility, toxicity, or volume and implementability. If, during detailed design, technical problems with spray drying surface, the Army will raise this issue to the Organizations and State.

The detailed technical information that follows consists of three elements:

- Brief descriptions of both alternatives (spray drying and brine management)

- Re-ranking of the treatment alternatives, using a brine management option for each treatment alternative for which this is possible
- Arguments for and against each of the two options

#### Descriptions of Both Alternatives

##### Spray Drying

Spray drying is a particle formation process. It is used for the continuous production of dry solids in powder, granular, or agglomerate form from a liquid feed. Spray drying involves the atomization of a liquid feed into a spray of droplets and contacting the droplets with hot air in a drying chamber. Evaporation of moisture from the droplets and formation of dry particles occur under controlled temperature and airflow conditions.

The spray drying process will dry the brine from the SQI to produce a salt that can be disposed of at an on- or off-site hazardous waste landfill. The spray-drying process equipment consists of a spray dryer, baghouse, air heater, pumps, fans, and storage tank.

##### Brine Management

Brine management is direct treatment of the brine in a permitted facility to remove the metals, destroy residual organics to a greater degree, and dispose of the remaining liquid. Two options for brine management have been identified, at the DuPont Chambers Works in Edgewater, NJ, and at the Encycle/Texas facility in Corpus Christi, TX.

The DuPont facility is a RCRA-permitted treatment plant consisting of precipitators, clarifiers, PACT (powdered activated carbon treatment) biological treatment units, and a secure landfill for solids disposal. In this facility, the metals in the brine would be precipitated out and landfilled on site in New Jersey, and the remaining liquid would be oxidized in the PACT process to destroy most of the remaining organics (if any). The remaining liquid would then be discharged to the Atlantic Ocean via the Delaware Bay under DuPont's NPDES (National Pollutant Discharge Elimination System, an EPA permit). DuPont has analyzed brine from SQI treatment of Basin F liquid and has stated that they will receive, treat, and discharge this brine under their NPDES permit.

The Encycle/Texas facility is also RCRA-permitted, but is geared for metals recovery and recycling. Metals would be precipitated and then recovered in elemental form for economic use. The remaining liquid would be treated biologically, and then discharged under an NPDES permit into a salty receiving stream. The suitability of the biotreatment process and the Encycle/Texas NPDES permit for disposal of SQI brine is being studied at present.

#### **Re-Ranking of Alternatives**

The base case ranking is presented below for a set of alternatives that includes brine management options wherever they are possible. This ranking was done by modifying the raw scores for each treatment alternative for which a brine management option is possible, and treating that modification as a new alternative. The new and old alternatives

## Woodward-Clyde Consultants

were then ranked together, using the same evaluation function as in the treatment assessment report. A table showing the modified raw scores is presented in an attachment to this response, along with sensitivity analyses of the expanded set of alternatives. (The attachment has been transmitted separately to the EPA).

Brine management is possible only with submerged quench incineration (SQI) and wet air oxidation with PACT (WAOP). The new alternatives have been given the abbreviations SQIB (submerged quench with brine) and WAOPB (WAOP with brine). The raw technical factor scores for SQI and SQIB and the scores for WAOP and WAOPB are the same with three exceptions. These exceptions are described below.

The SQIB technical factor score for reduction of toxicity, mobility, or volume is slightly improved over the score for SQI because the residual heavy metals in the brine will be removed before the brine is biologically treated. The salt portion of the brine will exit to the saline receiving stream (Delaware Bay), and a reduced volume of solids, containing the metals only, would be landfilled. If the metals are recovered (an option at one of the two plants that might receive this brine), the volume of residual metals would be reduced significantly. If the metals are merely fixed and landfilled, the mobility of the residual toxic metals would be reduced. The SQIB score for cost is improved over the SQI score. The lower cost of brine management reduces the overall cost of the SQIB treatment alternative by about 25%, compared to SQI with spray drying. The implementability for SQIB was slightly improved over SQI. The ease of operation and maintenance of facilities at RMA is improved by reducing the amount of equipment

involved in the process with the elimination of the spray dryer, associated air pollution control equipments, and associated piping. From a national perspective this would be somewhat offset by the use of treatment equipment at the brine receiving facility however, this equipment is already on-line and proven. In the analysis, the total cost of the SQIB option was the lowest of all alternatives and therefore was set as the point of reference; the cost scores of all other alternatives were reset in proportion to the SQIB score.

The WAOPB technical factor scores for reduction of toxicity, mobility, or volume and implementability are improved over the WAOP score for the same reasons given above for SQIB and SQI. The cost of WAOPB is less than the cost of WAOP, and this is reflected in a slightly improved cost score for WAOPB.

#### Ranking Results

The SQIB alternative ranks first in the base case and in all sensitivity analyses. The SQI alternative always ranks behind SQIB and always ranks ahead of all other alternatives. The WAOPB alternative usually ranks ahead of the WAOP alternative, and often ranks behind the WAO alternative. When reduction of toxicity, mobility, or volume is given relatively higher weight in a sensitivity analysis, WAOPB generally ranks ahead of WAO. The ranking positions of WAO, WAOP and WAOPB are usually in the middle of the rank order, often numbers 3,4 and 5. The addition of a brine management option does little to affect the overall position of wet air oxidation technology in comparison to other treatment options. The electric melter furnace performs

well in the base case (as it did in the treatment assessment report) but does not rank highly in the majority of the sensitivity analyses. Solidification consistently ranks last.

#### Arguments for and Against Solid Salt and Brine Management

##### For Solid Salt

-Multiple landfill locations exist to which the salts can be shipped.

-The shipment and disposal of solid metal-bearing salt residues is not uncommon in the U.S.

-There is a high likelihood of developing a contract for disposal of all the residual salts, with no potential for interruptions due to batch testing at the landfill site

-Transportation distance to a disposal site can be short, as opposed for significantly longer haul distances to any known brine facility.

-The quantities of materials to be shipped from RMA to an off-site facility are small relative to brine management.

##### Against Solid Salt

-A treatment plant that includes a spray dryer and ancillary equipment is more complicated to design, construct, operate and maintain than a plant that ships the SQI brine off-site.



-Solid salt generates a dust which will have toxic constituents; this dust must be managed, and it has an associated health risk. This risk is difficult to quantify, due to the difficulty in estimating fugitive dust emissions.

-The option has a higher cost, due primarily to the capital and operating costs of equipment.

-The evaporation of the entire water content would generate a continuous water vapor cloud.

-Metals recovery is not feasible; toxic metals will be landfilled and may be leachable over time.

For Brine Management

-Brine management is simpler than spray drying because less equipment is involved at the RMA treatment facility. There is only one source of air emissions on an SQI plant with brine management, as opposed to two sources exhausting through one stack on a plant with spray drying; and environmental control systems are smaller and less complex. Process control systems are simplified when spray drying and solids management are eliminated.

-Brine management is safer from a process operation standpoint than solid salt management because no dust will be generated and no high temperature processes are involved.

-Brine management is less expensive than solids management.

-Brine management will reduce the amount and/or the mobility of toxic metals. Of the two available options, one includes

a metals recovery and recycling process, and the other includes a chemical fixation step that would make metals less mobile in the environment.

Against Brine Management

-There is some contract uncertainty with brine management, since the treatment facilities can refuse to treat the waste on a "per-carload" basis. From the standpoint of this evaluation, this uncertainty is considered to be acceptable, since the brine is not unusual and is well within the design limits of both brine management facilities. DuPont has committed in writing to receive and treat SQI brine from Basin F liquid treatment. The receiving waters where both brine facilities are located are important environmental resources, and future changes in their NPDES permit requirements could theoretically affect acceptance of Basin F product brines. However, the shipment of Basin F product brines is a finite, short-term activity that will not likely be affected by long-term regulatory changes.

-The transportation distance for brine is much greater than for solid salt. The nearest brine facility is on the Texas Gulf Coast; the other is on the Eastern Seaboard. The nearest landfills that could receive solid salt are in Utah and Oklahoma.

-Brine management includes disposal of a salty liquid (water plus chlorides, phosphates, and sulfates) to surface waters. The disposal would involve the same quantity of salts as the salt option, but a larger total volume of residuals due to the water content of the brine. There is some potential that regulators in Colorado or in the

vicinity of the brine management facility could be concerned about degradation of surface water quality from this discharge. Both brine management facilities have NPDES permits that specifically allow discharge of salty liquids to surface waters; the Texas facility discharges to the Gulf of Mexico, and the East Coast facility discharges to the Delaware Bay on the Atlantic Ocean. This would include SQI brine from Basin F liquid.

TABLE  
BASE CASE

| Criteria               | Weight | EMELT | SQI | SOLID | WAO | WAOP | SQIB | WAOPB |
|------------------------|--------|-------|-----|-------|-----|------|------|-------|
| Short Term Effect      | 10     | 1.4   | 2.3 | 2.7   | 2.0 | 2.0  | 2.3  | 2.0   |
| Reduction of TMV       | 30     | 2.5   | 2.5 | 1.0   | 1.5 | 1.7  | 2.6  | 1.9   |
| Implementability       | 20     | 0.9   | 2.4 | 1.5   | 2.1 | 1.8  | 2.4  | 1.9   |
| Overall Protectiveness | 20     | 1.6   | 2.6 | 1.2   | 1.6 | 1.9  | 2.6  | 1.9   |
| Cost                   | 20     | 2.0   | 2.2 | 0.6   | 0.9 | 0.8  | 3.0  | 1.2   |
| TOTAL SCORE            |        | 179   | 241 | 123   | 157 | 161  | 262  | 178   |
| *****                  |        |       |     |       |     |      |      |       |

EMELT = Electric Melter Furnace  
 SQI = Submerged Quench Incineration with Spray Drying  
 SOLID = Solidification  
 WAO = Wet Air Oxidation  
 WAOP = Wet Air Oxidation with Powdered Activated Carbon Bio-treatment (PACT) and Spray Drying  
 SQIB = Submerged Quench Incineration with Brine Management  
 WAOPB = Wet Air Oxidation with PACT and Brine Management  
 TMV = Toxicity, Mobility, or Volume

Comment 2: The introduction to the document states that the "standards for selected nonregulated compounds" will be included in the Implementation Document. Rather than such a brief statement on such an important topic, the document should point out the relationship between such standards and the trial burn. It should also stress the commitment on page 9-6 to a

design and operating requirement for no cumulative risk higher than one in one million of excess cancer incidence, or hazard index greater than 1, in the nearest exposed population, whether on or off RMA. Further, the mechanism set forth in the regulations needs to be specified in some detail in the Final Decision Document to later both adopt as enforceable such specific standards, and specify both continuous emission and ambient monitoring programs to verify compliance and protection of human health and the environment. We need to begin work together with yours staff on that matter promptly. (See our ARARs comments.)

Response: See response to U.S. EPA General Comment 2.

Comment 3: A concern related to the previous comment: the document uses the terms "predesign pilot test of the incinerator" and "preoperational trial-burn," and perhaps others, in ways that make unclear the time and process relationship between the past pilot (T-Thermal) test, any future pilot test, the design, the trial burn, and the emission standards to be established and achieved.

Response: The inconsistencies associated with the SQI past and future testing have been clarified. The past testing at T-Thermal is referred to as treatment evaluation tests, any testing during engineering design phases is referred to as predesign tests, and the on-site SQI testing prior to treatment is referred to as full-scale trial burn.

Comment 3: The confusion arises from at least the following  
(cont.) statements:

- On page 1-2, the last sentence states that engineering details will be included in the Implementation Document. One of the details identified is "... Standards for selected nonregulated compounds". On page 9-5 at the very bottom, the document states: "...the trial burn plan and subsequent standard setting actions will be subject to EPA concurrence." This appears to be a contradiction since the trial burn cannot be done until after the incinerator is constructed which should be long after the Implementation Document.

Response: The text in the document has been changed to eliminate the contradictions. The standard-setting procedures for nonregulated compounds will be included in the Implementation Document. These standards for nonregulated compounds will be finalized after the full-scale trial burn. Both of these will be subject to EPA concurrence through the review process.

Comment 3:  
(cont.)

- On pg 6-4, the draft decision document states that a preoperational trial burn plan will be developed for review by EPA and others. In conjunction with the preoperational trial burn plan, the Army will develop monitoring plans and procedures, and emergency response plans and procedures. Will these plans be part of the Draft Implementation Document anticipated to be completed on December 21, 1990?

Response: Yes. The Monitoring and Emergency Plans and Procedures addressed in this comment will be included in the Draft Implementation Document, not as part of the preoperational Trial Burn. The text has been changed to clarify this.

Comment 3: • On pg 6-5 and 6-6, the document states that a special  
(cont.) predesign pilot test of the incinerator will be done. Will there be a test plan for the interested parties to review? What incinerator will be used for this predesign pilot test? When will it be done? Is the intent to better identify all emissions measured in the T-Thermal Test or just to identify PICs?

Response: The text has been changed to indicate that the predesign test will be performed at T-Thermal's existing SQI test facility in Conshohocken, PA. The predesign test will not be a formal EPA-type trial burn with the accompanying trial burn plan. The test will be performed prior to the design process. The intent of this test will be not to identify emissions or PICs, but to develop engineering data related to optimization of nozzle performance and performance of metals control equipment. However, in order to address uncertainties that arose from prior test work, an analysis for dioxins and furans will be performed on both the feed liquid and air emissions from this test.

Comment 3: • On pg. 10-1, the document states that pilot-scale test-  
(cont.) ing and preparation of final design documents have been incorporated into the schedule for the Implementation Document for this IRA. The Draft Implementation Document (design) is scheduled for completion on 21 December, 1990. The document states that milestones have been developed but the milestones are not listed. When will the pilot-scale testing be done? What are the other milestones and when are they projected to be completed?

Response: The schedule for steps leading to issuance of the Implementation Document in December 1990 will be finalized at a later date, once a design organization has been selected and the Army has received their commitment to perform.

Comment 3: • Page 2-3, last sentence. The text refers to pilot testing as a remaining step to be performed. How is (cont.) this testing to be different than the T-Thermal test? Are they referring to the test burn?

Response: The predesign test will be designed to aid in the equipment design process, specifically to develop data on 1) feed nozzles, and 2) metals emission control. A major scope of the test will address atomization nozzle performance. This test is not considered a trial burn.

Comment 3: • Page 6-1, last bullet. The text discusses the SQI (cont.) pilot testing as already done. The document needs to clarify what further pilot testing is required for SQI.

Response: Treatment evaluation tests have been performed on pilot-scale equipment at T-Thermal. The predesign tests will be performed to aid in equipment optimization during the design effort.

Comment 3: As noted in our comments on ARARs, the Army must closely (cont.) follow the operational-requirements derivation process set forth in the RCRA regulations at 40 CFR Part 270 and 264 Subpart O. Care must be taken to use the proper terminology when this process is described in detail in the Final Decision Document. For example, conducting a pilot test for design does not satisfy the requirement for a trial burn. The CERCLA and technical process relating to the tests and

standards must be clearly expressed via editing of several portions of the document.

Response: The CERCLA and technical process relating to trial burns and standard-setting procedures will follow the outline established in Section 9.0 of the document.

Comment 4: Page 4-3, last paragraph, first sentence.

The text implies that there are only three commercial incinerator sites equipped to take Basin F liquids. The Army chose the criteria that the commercial incinerators had to be a liquid injection-type incinerator, but many of the incinerators that the Army screened out on that criteria do take liquids. Please correct the text.

Response: There were only three commercial incinerator sites which indicated that they would accept Basin F liquids for sole-source firing. The other incinerators would blend Basin F with other wastes for incineration. The text has been changed to read, "A survey of the capabilities of existing commercial hazardous waste direct liquid injection incinerators showed...." Incinerators other than direct liquid injection require more stringent feed characteristics (low ash, high Btu content).

Comment 5: The Final Decision Document should specify that the residue from cleaning the three tanks and surface impoundment now holding the liquids will also be destroyed via the SQI as part of this IRA. It also should address in more detail the closure of the tanks and ponds, as referenced on page 6-5.



Response: The following sentence has been added to the text on page 6-3, "A feed system design which incorporates recirculation, suspension, jet mixers or other means will be evaluated in the design phase. This will allow all residue that can be dissolved from cleaning the three tanks and surface pond now holding the liquid to be fed to the SQI." Any residue or crystals which remain insoluble and cannot be fed to the SQI will be managed with the Basin F soils and addressed by the On-post Record of Decision (ROD) or an additional IRA phase, if necessary.

RESPONSE TO EPA'S COMMENTS ON  
THE APPLICABLE OR RELEVANT  
AND APPROPRIATE REQUIREMENTS ON  
THE BASIN F LIQUID IRA

At the outset it should be noted that the ARARs section in this Proposed Decision Document is much improved over the previous version in the Assessment Document. There is both greater detail and greater scope in this document's ARARs analysis. Nevertheless, EPA still has some particular concerns and comments set forth below.

Comment 1: Establishing incinerator operating requirements. On page 9-5 the document states that the Army has determined that it will use a process "similar to" the 40 CFR part 270 process to derive incinerator operating requirements. It is our understanding that the Army intends to closely follow this regulatory process and that the only deviations which would occur relate to the fact that an actual permit is not required under CERCLA Section 121(e). This language should be changed accordingly.

Response: This language has been revised in response to this comment.

Comment 2: Role of EPA. On page 9-5, 9-6, and in several other places, the document states that, inter alia, operating parameters will be subject to EPA "concurrence." The EPA regulations at 40 CFR part 264, subpart O and part 270 are written terms of EPA "approval." This distinction should have no practical effect as long as the parties understand that EPA concurrence is a prerequisite to operation of the incinerator. Because EPA has such an important final concurrence role, we expect to work closely with the Army at each step of the process from this point forward to develop acceptable designs, monitoring programs, contingency plans, operating requirements and schedules.

Response: The Army will work closely with the EPA throughout the process for this IRA. As reflected in the Draft Final Decision Document, EPA concurrence is necessary in order for the Army to proceed with incinerator operations.

Comment 3: Health-based operating requirements. On pages 9-6 through 9-7 the document explains that a design and operating requirements has been established to ensure that this final remedy for the Basin F liquids will protect human health and the environment. EPA endorses this requirement for achieving a cumulative risk no greater than  $10E-6$  (for carcinogens) and a hazard index no greater than 1 (for noncarcinogens). However, the language concerning when the Army will proceed to amend the decision document needs to be modified. Without question, if there is a departure from the CERCLA risk range, an amended decision document would have to be issued. In addition, however, such an amendment would also have to be issued if the Army determined the deviation was significant in terms of human health or protection of the environment.

Response: The Army is confident this design and operating requirement can be attained by the selected technology. The Draft Final Decision Document reflects that the Army will amend the Decision Document if a significant deviation, in terms of human health or protection of the environment, from the design goal is necessary.

Comment 4: Land Disposal Restrictions (LDRs). The language of pages 9-15 through 9-16 purports to state that the LDRs will play only a very limited role in the replacement of soil excavated for purposes of constructing the incinerator. In

support of this position citation is made to the TPP and a 1985 EPA Region VIII Guidance memorandum. The Army should note that there have been and will continue to be developments in implementing and expanding the scope of the LDRs. EPA anticipates that additional guidance and regulations will likely be in place in the near future. The language should therefore note that all work will be done in compliance with the LDRs and attendant guidance in effect at the time the work is done.

Response: While present guidance is limited, the Army has not identified any waste subject to LDR will be present in any soils that may be excavated by construction of this treatment system. More listings are scheduled to be completed prior to the implementation of this IRA and the Army will review these as they are released. If a restricted disposal waste is present, the Army will act in a manner consistent with EPA guidance then in effect for the management of such in the context of CERCLA cleanup actions. The Draft Final Decision Document reflects this approach.

Comment 5: Substantive RCRA requirements. On pages 9-16 through 9-17 there are listed various provisions from the RCRA regulations which the Army considers "substantive" and hence ARARs. This language should be changed to clarify that it is not intended to be an exhaustive list.

Response: The cited language has been revised in response to this comment.

Comment 6: Closure of tanks and ponds. On page 6-5 the document states that closure of the tanks and ponds is included in this

IRA. Accordingly, the Final Decision Document must contain a detailed ARARs analysis for such closure with special attention given to the RCRA requirements.

Response: The Draft Final Decision Document includes a discussion of ARARs for the closure of the tanks and ponds.

Comment 7: Opacity. On page 9-31 the last response is not correct. The comment was that smoke and opacity standards should be included as ARARs. The response states that smoke and opacity standards are considered action-specific ARARs and are discussed in that section. "That section" is on page 9-9 and is identified to be applicable to "Construction of the Treatment System." The "Action Specific ARARs" as identified on page 9-9 are not applicable to the operation of the incinerator which was the most significant basis of the original comment. Possible ARARs include the state's regulation #1 and the New Source Performance Standards for Incinerators.

Response: The Draft Final Decision Document has been revised in response to this comment.

APPENDIX A.2  
STATE OF COLORADO - COMMENTS AND RESPONSE

---

A.2-1

## STATE OF COLORADO

## COLORADO DEPARTMENT OF HEALTH

4210 East 11th Avenue  
Denver, Colorado 80220-3716  
Phone (303) 320-8333

Telex:  
(303) 322-9076 (Main Building/Denver)  
(303) 320-1529 (Pitman Place/Denver)  
(303) 248-7198 (Grand Junction Regional Office)



January 29, 1990

Roy Romer  
Governor

Thomas M. Nelson, M.D.  
Executive Director

Mr. Donald Campbell  
Office of the Program Manager  
Rocky Mountain Arsenal  
AMXRM-PM, Building 111  
Commerce City, CO 80022-2180

Re: State comments on the Proposed Decision Document for Basin F  
Liquids IRA

Dear Mr. Campbell:

Enclosed are the State's comments on the Proposed Decision Document for the Basin F Liquids Interim Response Action (IRA), along with State comments on the Basin F IRA Proposed Applicable or Relevant and Appropriate Requirements (ARARs). In developing these comments, the State has considered technical viability, health protection concerns, operational controls, protection of air quality and the need for air monitoring, and confirmatory oversight. In addition, we have considered whether there exists a viable alternative to incineration that can be operational within the timeframe established by the five-year life expectancy of the tanks now holding the Basin F liquids. Representatives of the State have also attended meetings with the public, and made individual contacts to community and environmental group leaders, to discuss citizen concerns about the proposal. We also appreciate the efforts of the Army to respond to concerns expressed by the citizens, as well as by the State and EPA.

Based upon this review, the State agrees with the Army's selection of submerged quench incineration (SQI) as the preferred alternative for treatment of the Basin F liquids, providing the Army agrees to satisfy the following conditions:

First, the Army will incorporate the design objectives, ARARs, and other requirements contained in the attached State's comments into the Final Decision Document, and will commit to meeting those as well as the objectives and requirements acknowledged in the Proposed Decision Document.

Second, the Army will allow the State to aid in the development of the design, construction, and test burn and closure phases, and will allow the State to inspect the incinerator and premises, examine all available data, and otherwise be in a position to assess the performance of the incineration process so that it can ensure the protection of public health and the environment.

Mr. Donald Campbell  
Page 2  
January 29, 1990

Third, independent oversight of the design, construction, test burn, operational and closure phases of the incineration project will be established.

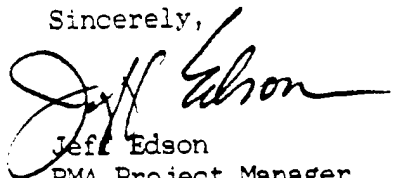
In addition to these conditions, the State urges the Army to involve the public in the design, construction, test burn, and operational phases of the project. Many people have expressed a need for continuing knowledge about this very significant treatment program. The public will require information to demonstrate that the incineration process as implemented is safe.

We may have additional comments related to risks from the air emissions from SQI, including products of incomplete combustion (PICs), when we have had the opportunity to review the Army's Draft Public Health Risk Assessment Report, which we did not receive until January 25, 1990. Additional testing for PICs during the "predesign pilot test" may be required if this report is found to be inadequate to demonstrate that acceptable PICs emissions can be achieved.

We encourage the Army to move ahead with this project in an expeditious yet very cautious manner. Ultimately, the successful and safe treatment of the Basin F liquids depends upon the careful work of the Army and its contractors in the design, construction, and operation of the incinerator. At the same time, we appreciate the Army's verbal commitment to provide financial assistance to the State for oversight, and to provide funds to the EPA for an independent contractor. Such oversight will help to ensure things are done properly and safely.

I am available to discuss these comments at any time.

Sincerely,



Jeff Edson  
RMA Project Manager  
Hazardous Materials and  
Waste Management Division

JE/cf

cc: Michael Hope  
Chris Hahn  
Edward McGrath  
John Moscato  
Connally Mears  
Bruce Ray  
Tony Truschel  
Major Lawrence E. Rouse



**RESPONSE TO COMMENTS OF STATE OF COLORADO  
ON PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID DISPOSAL**

RESPONSE TO COMMENTS IN  
COVER LETTER FROM STATE OF  
COLORADO, JANUARY 29, 1990

Based upon this review, the State agrees with the Army's selection of submerged quench incineration (SQI) as the preferred alternative for treatment of Basin F liquids, providing the Army agrees to satisfy the following conditions:

Comment 1: First, the Army will incorporate the design objectives, ARARs, and other requirements contained in the attached State's comments into the Final Decision Document, and will commit to meeting those as well as the objectives and requirements acknowledged in the Proposed Decision Document.

Response: The Army has responded to the State's proposed requirements as they are expressed in the specific comments which follow.

Comment 2: Second, the Army will allow the State to aid in the development of the design, construction, and test burn and closure phases, and will allow the State to inspect the incinerator and premises, examine all available data, and otherwise be in a position to assess the performance of the incineration process so that it can ensure the protection of public health and the environment.

Response: The Army welcomes the State's cooperation in the development of design, construction, test burn, closure, or performance assessment consistent with the Federal Facility Agreement. As the State is aware, development of specific arrangements

to assure the State meaningful participation in the oversight of this project is the subject of continuing discussions between EPA, the Army, Shell and the State. The Army is committed to achieving a mutually satisfactory resolution of this matter.

Comment 3: Third, independent oversight of the design, construction, test burn, operational and closure phases of the incineration project will be established.

Response: The Army agrees to independent oversight by an engineering organization retained by EPA and reporting to the Army, State, EPA, and Shell. The details of this independent oversight will be developed later by the Organizations and State and may potentially include a format for reporting directly to the public. The State and EPA will retain the same intensive review and comment opportunity currently provided within the context of the Federal Facility Agreement.

Comment 4: In addition to these conditions, the State urges the Army to involve the public in the design, construction, test burn, and operational phases of the project. Many people have expressed a need for continuing knowledge about this very significant treatment program. The public will require information to demonstrate that the incineration process as implemented is safe.

Response: The Army has previously stated in past public meetings that we will involve the public in the remaining phases of this IRA through further public meetings, information newsletters, or information meetings as appropriate throughout the timeframe of the remaining activities.

Additional public involvement may also be provided through EPA's Technical Assistance Grant (TAG) program.

Comment 5: We may have additional comments related to risks from the air emissions from SQI, including products of incomplete combustion (PICs), when we have had the opportunity to review the Army's Draft Public Health Risk Assessment Report, which we did not receive until January 25, 1990. Additional testing for PICs during the "predesign pilot test" may be required if this report is found to be inadequate to demonstrate that acceptable PICs emissions can be achieved.

Response: The Army has subsequently received State comments on the subject Risk Assessment Report. The Risk Assessment is part of the next phase of this project, i.e., design. The State comments received to date on the draft Health Risk Assessment are being taken into consideration and will be addressed in the Implementation Document. A separate letter response to the State will be provided addressing comments received.

**SPECIFIC COMMENTS:**

Comment 1: Supercritical water oxidation is a very promising technology which has several apparent advantages over submerged quench incineration (SQI), as noted in the State's comments on the Draft Alternative Assessment Document. It is unfortunate that this technology was not considered and tested earlier in the alternative assessment process. At this point, we agree that it would not be possible to do adequate testing and to design, construct, and implement the technology within the required time frame. In addition, because it is

unproven on a commercial scale, it is less certain that it could be implemented successfully to treat the Basin F liquids. SQI, on the other hand, has been proven successful on a commercial scale.

Response: We agree that supercritical water oxidation (SCWO) is a potentially promising technology for certain hazardous fluids and wastewaters. We also agree that it appears that this technology will not be commercially available within the timeframe of the Basin F Liquid IRA, unlike the submerged quench incinerator which has been commercially proven in similar hazardous wastewater applications. It should be noted, however, that the Army and Shell did briefly consider SCWO early in the alternative assessment process, although it was not bench tested. SCWO as a technology is related to wet air oxidation. Wet Air Oxidation, which operates below the critical temperature and pressure of water, was bench tested instead of SCWO because of availability (A.D. Little, Technology Inventory and Screening Report, 8/88 and 1/89). Please refer to the EPA's General Comment 5.

Comment 2: Wet air oxidation (WAO) or WAO w/powdered activated carbon treatment (PACT), if combined with granular activated carbon (GAC) treatment of the off-gases, would present slightly lower health risks to workers and the local population than submerged quench incineration (SQI), according to the State's emission estimates. The Final Assessment Report did not adequately respond to the State's comments on this issue. Despite the inclusion of spray drying in the wet air oxidation treatment system, metals emissions from WAO would be significantly lower than from SQI because of the substantially lower operating temperature for WAO and

correspondingly lower volatilization rates for metals in the waste. Organics emissions from WAO (with GAC) would be roughly equivalent or only slightly higher than organics emissions from SQI (even though SQI achieves greater overall destruction of organics). Because in this case, metals emissions cause more significant risks than organics, the net result is that health risks would be slightly lower for WAO or WAO with PACT than for SQI. Thus, statements that SQI is the alternative that is "the most protective of human health and the environment" are inaccurate. Nevertheless, because of its other advantages, including the generation of lower volumes of treatment residues with lower concentrations of organics, as well as significantly lower costs, and because SQI is sufficiently protective of public health, the State agrees that SQI is the preferable alternative.

Response: The Army notes that the State agrees that SQI is the preferable alternative when compared to WAO or WAO with PACT. We would like to elaborate on the State's discussion of relative health risks between these two technologies. The Army agrees that the higher operating temperature of the SQI will result in a greater partitioning of metals into the gas phase during incineration, but prior to quenching and scrubbing of the exhaust gas. The State should note that the true outlet of the SQI is a saturated and partially scrubbed exhaust gas at approximately 190°F. Moreover, the gases do not exit the process under these conditions but undergo further scrubbing steps. We stand by our statement that the SQI alternative is the most protective of human health and the environment. We welcome State input and suggestions in the design of a pollution control system to minimize metal emissions. The Army would also like to point out that the risk evaluation of SQI in the Assessment Report

was based on a theoretically assumed presence of arsenic in the stack gas. There was no arsenic detected in the measured emissions from the treatment evaluation testing performed at the T-Thermal facility in Conshohocken, PA.

Comment 3: The State accepts the Army's selection of SQI as the preferred alternative to treat the Basin F liquids in the required time frame, based on the following conditions:

3.1: The emission standards and performance standards included on page 9-6 of the Draft Decision Document are very important, including the goal of less than  $10^{-6}$  cumulative excess cancer risk from emissions of carcinogenic compounds (organic and inorganic), and the goal that the hazard index for noncarcinogenic compounds must be less than 1.

In order to ensure that these standards can be achieved within the established schedule, the following tests should be undertaken during the proposed predesign pilot testing:

3.1.1 We agree with the proposal on pp. 6-5 and 6-6 of the Proposed Decision Document that products of incomplete combustion (PICs) emissions should be analyzed to determine if the carcinogenic risk is indeed less than  $10^{-6}$ .

Response: The Army agrees and has previously stated that products of incomplete combustion (PICs) should be analyzed to determine carcinogenic risks as part of the full-scale trial burn program, but does not believe that a complete PIC analysis is required during predesign testing. The predesign tests are primarily intended to supply engineering information

which will aid in equipment optimization during the design effort. We do agree, though, that a subsequent analytical testing program which includes the analysis of dioxins and furans needs to be evaluated and conducted as necessary during the predesign testing. Complete PIC analysis and the associated risk determination will be performed during the full-scale trial burn. This trial burn will follow current EPA guidance and regulations.

Comment:           3.1.2   Emissions of PICs and carbon monoxide (CO) levels are related to the performance of the waste atomizing nozzles which were problematic during the previous T-Thermal pilot test. Therefore, the choice and performance of these nozzles must be optimized during the next pilot test.

Response:       The Army agrees that emissions of PICs and carbon monoxide (CO) are related to waste atomizing nozzle performance. The major scope of further predesign testing will be to optimize nozzle performance. The findings from this evaluation will be incorporated into the full-scale system design. The text in the Decision Document has been revised to reflect this.

Comment:           3.1.3   Also related to the nozzle performance and PIC emissions, CO emissions must be monitored continuously, and a one-hour rolling average of 100 ppm should be achieved (see Comment 3.4.2).

Response:       The Army agrees to continuously monitor CO emissions. Establishment of a one-hour rolling average limit will be addressed during the full-scale trial burn program along with the other items mentioned in Comment 3.4.2. Please refer to the response provided for Comment 3.4.2.

Comment: 3.1.4 For metals (especially Arsenic (As)), the maximum allowable emission rates for  $10^{-6}$  excess cancer risk can be estimated. The removal efficiencies required to meet this emission standard for arsenic and the standard for particulates at 40 CFR 264.343(c) should be calculated and tested during the pilot test.

Response: The Army agrees that an estimated metal removal efficiency can be derived from carcinogenic risk estimates. The optimization of equipment for control of arsenic by the overall SQI system will be made during predesign tests. The exact removal efficiencies for metals of the full-scale system can only be determined, along with the associated risks, as part of the full-scale trial burn program. The calculation for a design removal efficiency is given below for arsenic.

Calculation of Emission Rate for  $10^{-6}$  Cancer Risk  
For Arsenic at the Point of Maximum Impact - On-Site

| Route      | Emission Rate<br>g/sec | Concentration      | Intake Factor<br>$m^3$ or mg/kg/day | Daily Intake<br>mg/kg/day | CPE<br>(mg/kg/day) $^{-1}$ | Cancer<br>Risk |
|------------|------------------------|--------------------|-------------------------------------|---------------------------|----------------------------|----------------|
| Inhalation | 1.773E-03              | 8.83E-07 mg/ $m^3$ | 1.62E-03                            | 1.43E-09                  | 5.0E+01                    | 7.15E-08       |
| Oral       | 1.773E-03              | 1.04E-00 mg/kg     | 5.09E-07                            | 5.30E-07                  | 1.75E+00                   | 9.28E-06       |
|            |                        |                    |                                     |                           | Total Risk                 | 1.00E-06       |

The removal efficiency for the  $10^{-6}$  cancer risk emission rate of 1.773E-03 g/sec is calculated as:



## Woodward-Clyde Consultants

$$\frac{\text{Emission Rate}}{\text{Feed Rate}} = (1.0 - \text{removal efficiency})$$

Feed Rate

$$\frac{1.773\text{E-}03 \text{ g/sec}}{8.411\text{E-}03 \text{ g/sec}} = (1.0 - \text{removal efficiency})$$

8.411E-03 g/sec

$$(1 - \text{removal efficiency}) = 2.108\text{E-}01$$

$$\text{removal efficiency} = 0.7892$$

$$= 78.92\%$$

Comment 3.1: The above-testing should be performed during the pilot test (concluded) to avoid the scenario in which unexpected problems jeopardize the achievement of ARARs and design objectives within the established schedule, thus requiring a modification of the Decision Document.

Response: As stated in the previous response, the optimization of equipment for the control of arsenic by the overall SQI system will be made during predesign tests. The trial burn of the full-scale equipment and the standard-setting process are the best ways of ensuring that unexpected problems are avoided. SQI is a proven technology and the Army does not anticipate unexpected problems.

Comment: 3.2 Since the allowable emission rates for PICs and for toxic metals are determined based upon the assumptions in the risk assessment, these assumptions should not be changed without the prior approval of the State and EPA. One such assumption is whether the maximum exposed individual (MEI) is located at the point of the highest impact of the air emissions. In the Alternative Assessment Document this was assumed, but in the Proposed Decision Document, it is stated that the  $10^{-6}$  excess cancer risk and hazard index of 1 will not be exceeded for the nearest exposed population, not

including on-site workers. The State supports the former approach; however, a safe but reasonable alternative which could be used in the Final Decision Document, and upon which the allowable emission rates could be based, is to select the most conservative of the following:

- a). The MEI is located at the point of highest impact from air emissions and is exposed to inhalation, dermal absorption, and soil ingestion risks (12 hr/day for 2 years; however, if 12 hr/day is assumed, then bio-accumulation must be accounted for); or
- b). The MEI is located at the nearest facility boundary and is exposed to inhalation, dermal absorption, soil ingestion, and vegetable intake risks (24 hr/day for 2 years).

Response: It is the Army's interpretation that the "nearest exposed population" means evaluating the health risk to on-site workers at the point of the highest concentration at ground level based on modeling. On-site plant workers are used as the "nearest exposed population" and they would normally be exposed for no longer than an 8-hour day. It should also be clarified that health risks are not evaluated for the hypothetical so-called maximum exposed individual (MEI). Taken to the extreme, the MEI via inhalation could be assumed to inhale the stack emissions directly from the top of the stack 24 hours per day for the duration of the project. In order to minimize these unrealistic exposure scenarios, MEIs are not addressed. Potentially exposed populations are addressed. The only assumptions to be changed in this risk

assessment, if any, would only be the result of obtaining additional site-specific information on the potentially exposed populations or exposure pathways that would impact potential health risks. The suggested alternatives are unnecessary since the original approach has been taken.

Comment: 3.3 The State agrees that the standard setting process proposed by the Army should provide a reasonable mechanism for ensuring that the requirements of 40 CFR Part 264 Subpart O (Requirements for Hazardous Waste Incinerators) are achieved, as long as the State is given its proper oversight role along with EPA. To ensure that the State will be able to fulfill its responsibility to conduct a careful review of the Army's submittals, including the trial burn plan, and to oversee the trial burn and the continued operations, the State requires sufficient funds from the Army to pay for a full-time State employee or a State contractor and occasional analysis of split samples for the duration of the IRA. We are relying on the Army's verbal commitment to provide these requested funds. With this financial assistance from the Army, the State will be better able to assure the citizens of Commerce City and other surrounding communities that the incinerator operations are being conducted properly and as safely as possible.

Response: The Army agrees that this level of oversight and monitoring of split samples would be useful. As the State is aware, EPA, the Army and the State are engaged in a continuing discussion to identify how meaningful State participation in project oversight can be achieved. The Army is committed to resolving this matter to the mutual satisfaction of the

parties. (Please see the Army's response to State General Comment 3.)

Comment: 3.4 The substantive requirements of 40 CFR Part 264, Subpart O, as set forth on pp. 9-16 and 9-17 of the Proposed Decision Document, must be achieved, and the standard setting process described on pp. 9-5 through 9-7, must be followed. In addition to these requirements, the following requirements must be included in the Final Decision Document:

3.4.1 The Principal Organic Hazardous Constituents (POHCs) must be identified before the trial burn is conducted, rather than afterward, as stated on p. 9-6 of the Proposed Decision Document. This will ensure that the appropriate sampling equipment is used during the trial burn. In addition, the selected POHCs will need to be added to the waste feed at elevated (spiked) concentrations to allow their measurement in the stack gases.

Response: The Army agrees that POHC identification must be conducted prior to the full-scale trial burn, consistent with the regulations in 40 CFR Part 264. The text has been changed to reflect this. The POHC selection will be conducted as part of the full-scale trial burn program and be included in the trial burn plan which will be subject to EPA and State review prior to the actual burn. The trial burn plan will also include detailed information on the sampling equipment to be used for DRE determinations.

Comment: 3.4.2 The Army must implement continuous monitoring for total hydrocarbons (THC) as well as CO, during the trial burn. A standard must be developed for emissions of CO, based on the trial burn. CO must then be monitored continuously during operations and connected to automatic waste feed cutoff controls. An average concentration in the stack gas of 100 ppm, based on a one-hour rolling average, should be achieved if possible. If this CO standard is achieved, a standard for THC is not required to be established, according to EPA guidance.

If the CO concentration limit of 100 ppm (one-hour rolling average) cannot be demonstrated during the trial burn, the Army must identify an alternative CO limit together with a limit for THC, which is shown to result in an excess cancer risk (from total emissions, including POHCs and PICs) of less than  $10^{-6}$  to the maximum exposed individual (MEI). In this event, both CO and THC would be required to be monitored continuously during operations and be connected to automatic waste feed cutoff controls. (See Volume V of EPA's Hazardous Waste Incineration Guidance Series).

Response: These items will be addressed during the full-scale trial burn program. The Army has committed to adhere to EPA guidelines for hazardous waste incinerators. The State's comments reflect the EPA guidance which will be followed.

## Woodward-Clyde Consultants

Comment: 3.4.3 For toxic metals (mainly arsenic), the allowable emission rates for an excess cancer risk of less than  $10^{-6}$  (and hazard index of less than one) must be calculated. Achievement of these limits must be demonstrated during the trial burn. Limits on operating conditions related to particulate removal rates must then be established to ensure the continued achievement of the emission limits during operations. The selected operating conditions must be monitored continuously and connected to waste feed cutoff controls. (See Volume IV of EPA's Hazardous Waste Incineration Guidance Series).

Response: Please see the response to 3.1.4. The emission of arsenic that results in a conservatively calculated potential  $10^{-6}$  cancer risk to on-site populations at the point of maximum impact is  $1.773\text{E-}03$  g/sec.

The Army will determine during design the appropriate operating parameters that affect removal efficiencies for metals. The trial burn will demonstrate the limits on these operating parameters. The operating parameter limits and their connection to waste feed controls will be addressed during the design process and full-scale trial burn program.

Comment: 3.4.4 Limits on operating conditions related to hydrogen chloride (HCl) removal must also be established, monitored continuously, and connected to waste feed cutoff controls.

## Woodward-Clyde Consultants

Response: Hydrogen chloride emissions will be monitored by the Army. Operating conditions, monitoring requirements, and cutoffs will be addressed during the design process and full-scale trial burn program. Again, the Army will adhere to EPA guidelines for hazardous waste incineration.

Comment: 3.4.5 In addition to continuous monitoring and waste feed cut-off controls for CO and combustion temperature, as mentioned on p. 9-6 of the Proposed Decision Document, an indicator of combustion gas velocity and O<sub>2</sub> must be continuously monitored and connected to waste feed cutoff controls (for the trial burn as well as continuous operations). The incinerator's waste feed must automatically be cut off when established limits for any of these parameters are exceeded. Nitrogen oxides (NO<sub>x</sub>) and opacity should also be monitored continuously but do not require waste feed cutoff interlocks. The State recommends installing dedicated phone lines and a modem so that data pertaining to these continuously monitored parameters can be accessed by State computers at any time.

Response: The Army will monitor process parameters such as combustion gas velocity and oxygen (O<sub>2</sub>). Parameters such as nitrous oxide (NO<sub>x</sub>), opacity, other monitoring requirements, and cutoff interlocks will be addressed during the full-scale trial burn program. The State's recommendation of installation of a dedicated phone line for computer access will be addressed as part of discussions on independent oversight and State participation (See response to State General Comment 3).

Comment:            3.4.6    On some periodic basis (to be proposed by the Army in the Draft Implementation Document), additional sampling and analysis for emissions of organic compounds (including PICs), particulates (including toxic metals), and HCl must be performed to verify the achievement of the emission standards. Analysis of samples and distribution of results should be expedited as much as possible.

Response:           The Army agrees to and has previously stated that additional sampling and analyses to verify emission standard compliance should be performed and will be proposed in the Draft Implementation Document.

Comment:            3.4.7    A schedule for inspections and maintenance of the incinerator, air pollution control equipment, and monitoring equipment, must be developed. This schedule should also include calibration of the monitoring equipment and testing of the waste feed shutoff controls. The Final Decision Document should clearly provide for the development of this schedule and its submittal to the State and EPA for approval.

Response:           The requested inspection and maintenance schedules will be included in the Draft Implementation Document. The schedule for the Draft Implementation Document will be included in the Decision Document. The Army feels that it is premature to address these design and operational related issues in detail in this portion of the the IRA process.



Comment: 3.4.8 A high level of competence of the operators of the incinerator is also very important, and an outline of required qualifications and the training program for the operators must be developed. The Final Decision Document should provide for the development of this outline and its submittal to the State and EPA for approval.

Response: The requested operator qualifications and a training program will be increased in the Draft Implementation Document. The Army feels it is premature to address these operational issues in detail in this portion of the IRA process.

Comment: 3.5 The State agrees that a program for ambient monitoring must be established, as proposed on p 6-7 of the Proposed Decision Document. The State will comment on the Army's proposed ambient monitoring program in the Draft Implementation Document. The objectives of this program, however, must be included in the Final Decision Document. These objectives should include the following:

3.5.1 to assist in implementation of emergency procedures in the event of upset conditions or excessive fugitive emissions;

3.5.2 to assist in determining the actual risks to workers and the public from exposure to emissions, including fugitive emissions:

3.5.3 to compare actual exposure data to modeled values.

To fulfill these objectives, monitoring for gaseous emissions would be established at projected downwind maximum impact locations both on and off RMA property. All the fugitive sources related to the Basin F liquids IRA should be identified. Off-site monitors would be required to establish average and maximum ambient levels of target emission compounds. A background site would be required at a location removed from RMA impacts. The measurement of meteorological conditions at the emission point(s) as well as at representative off-post sites would be required.

Response: We agree with the stated objectives. An air monitoring program will be developed as part of the Draft Implementation Document which the State will have an opportunity to review. In a preliminary evaluation, however, gaseous emissions account for only 0.16 percent (.0016) of the potential carcinogenic risk and do not account for any contribution to the hazard index or noncarcinogenic health impact. A much more meaningful approach to meet the stated objectives would be to focus monitoring on total arsenic and cadmium, which could account for up to 70 percent of the total potential carcinogenic risk. Please also refer to response to National Toxics Campaign's comment 41, in Section A.6 of this report.

The "Treatment Assessment Report" which is available to the State demonstrated, using Agency guidance and very conservative assumptions that are likely to overstate any actual health risks, that unacceptable health risks are not associated with the incineration of Basin F liquid.

Comment: 3.6 On pages 6-7 and 9-17, the Army commits to the development of an Emergency Response Plan or Contingency Plan in compliance with 40 CFR 264 Subparts C & D. The following concerns should be included in these sections of the Final Decision Document.

The State is concerned that the Army prepare a comprehensive plan which will adequately protect public health, and avoid off-post health problems such as those that occurred during the excavation of soils at Basin F. Such a plan must be provided to CDH, the Division of Disaster Emergency Services (DODES), and local emergency response programs for review and comment, and must include, but not be limited to:

3.6.1 Procedures to respond to threats to human health both on- and off-site, including both acute and subchronic exposures. In order to satisfy this objective, the plan must include proposed trigger exposure levels related to measured ambient monitoring concentrations.

Types of responses should include shutting down the incinerator (if it hasn't already shut down in response to monitors of operating condition or continuous emission monitors such as for CO), repair or redesign of the incinerator if necessary, and covering or other measures to control sources of fugitive emissions.

3.6.2 An emergency notification plan which adequately alerts both the public and local, State, and

federal health agencies to situations which could pose an endangerment to public health.

- 3.6.3 Development of an emergency response team to answer and record complaints received from the public. This team should create a data base which will include, but not be limited to, the following information:

3.6.3.1 time that complaint is received;

3.6.3.2 subject matter of complaint with a detailed description of all symptoms;

3.6.3.3 meteorological conditions including wind direction, wind speed, temperature, etc.;

3.6.3.4 complete description of response team's actions regarding each complaint. This information must be provided to the EPA, CDH, and the Tri-County Health Department within 24 hours of the initial complaint.

- 3.6.4 A commitment from the Army to fund additional health related activities, including studies. These health related activities may be needed if there are significant numbers of complaints of health problems, documented as described in 3.6.3. The State must be involved in any decisions regarding whether additional health studies are needed.

## Woodward-Clyde Consultants

Response: The Army agrees that the above-mentioned concerns need to be addressed under the Emergency Response Plan or Contingency Plan. We do not believe it beneficial or practical to address these concerns in the Final Decision Document.

As the State is aware, an existing Arsenal-wide plan has already been developed with local officials and Division of Disaster Emergency Services (DODES). The Army plans to argument/amend this plan with specific procedures related to Basin F liquid treatment. The revised plan will address the specific Colorado Department of Health (CDH) concerns noted above.

Comment: 3.7 The Army must provide for independent oversight of the design, construction, trial burn, operational, and closure phases of the incineration project. This objective must be included in Section 6.2 of the Final Decision Document. The State is relying on the Army's verbal commitment to provide adequate funds to EPA for an independent contractor to satisfy this objective.

Response: As we mentioned in the response to the State's General Comments 2 and 3, the Army agrees to such oversight and State review within the general context of the FFA.

Comment 4: The residues from the treatment process must be managed as described on p. 9-18 of the Proposed Decision Document, including analysis to determine whether the salts are hazardous waste. However, since the Basin F liquids contain listed hazardous wastes, the salts from the incineration process will require disposal as hazardous waste unless they can be delisted by meeting the requirements of 6 CCR 1007-3, Section 260.22 and 40 CFR 260.22.

## Woodward-Clyde Consultants

Response: Treatment process residues will be managed as outlined in Section 9.0 of the Decision Document. Specific disposal or delisting requirements will be identified when the specific contents of the residues are known later in the IRA process.

Comment 5: The basis for the selection of on-site spray drying of the brine and scrubber water vs. shipment of these liquids to the Dupont facility should be explained in the Final Decision Document. The basis should include a discussion of the risks and hazards of each option, the costs, and the relative reductions in toxicity, mobility, and volume. Also, the basis for not proposing copper recovery from the brine solution should be included.

Response: Please see the Draft Final Decision Document, Section 6.0, in which these issues are addressed. (Also please see response to EPA Specific Comment 1.)

Comment 6: Because of the concerns about stratification of Basin F liquids, the State agrees that additional characterization is required prior to the predesign pilot test and the trial burn to ensure that representative worst-case samples of the liquids are used for these tests (see Army response to the State's Specific Comment Number 2 on the Draft Alternative Assessment Document).

Response: The predesign test will not be a pilot test but primarily will involve engineering testing to optimize the design of feed system and metals emissions control equipment. Nevertheless, feed characterization will be performed to aid in quantification of the fate of metals. Additional characterization will be performed prior to, and as part of, the full-scale trial burn.

Comment 7: As stated on p. 6-5 of the Proposed Decision Document, the Army intends to choose the specific site for the incinerator "based on the objective of minimizing potential health effects related to routine and upset emissions." The State would like to further emphasize the importance of this objective in the site selection process.

Response: The Army plans to situate the equipment so as to provide the maximum protective buffer zone between the equipment and the nearest citizen population, while simultaneously minimizing the transportation risks involved in transferring liquid from the storage tanks/pond to the treatment facility.

**RESPONSES TO THE STATE'S COMMENTS ON  
DRAFT APPLICABLE OR RELEVANT AND  
APPROPRIATE REQUIREMENTS FOR  
BASIN F LIQUID IRA**

**GENERAL COMMENTS**

Comment 1: It is the State's position that these general and specific comments are submitted without waiving the State's legal position on the independent enforceability of RCRA/CHWMA to the IRA site. The Basin F liquids contain listed hazardous wastes regulated under the Colorado Hazardous Waste Management Act (CHWMA) and applicable regulations (6 CCR 1007-3). Therefore, any treatment or storage or disposal of the liquids requires a CHWMA permit. Any on-site disposal site would be required to meet the requirements for the siting of a hazardous waste disposal site found in the CHWMA regulations. Any off-site disposal would have to be accomplished at a permitted facility; transportation would be subject to, and have to meet the manifest requirements and the transporter requirements contained in the CHWMA regulations. See specific comments below. However, without waiving these legal arguments, the State submits the following comments.

Response: As the State is aware, the Army is proceeding consistent with CERCLA in the conduct of this IRA. ARARs are identified consistent with the provisions of CERCLA Section 121, 42 U.S.C. §9621.

Comment 2: In its evaluation of the Submerged Quench Incinerator, the State relied on the Army's commitment to meet at a minimum, those ARARs recognized in Section 9 of the Proposed Decision Document. Failure to meet any of the ARARs set forth in the



## Woodward-Clyde Consultants

Proposed Decision Document may invalidate the State's analysis and conclusions as presented in these comments.

Response: Comment noted. No text change is necessary.

Comment 3: The Colorado Air Pollution Control Division (APCD) has recently formed a subcommittee for the promulgation of toxic air pollutants standards. Although the Colorado Air Pollution Control Commission Subcommittee on Toxic Air Pollutants has not yet promulgated any regulations, regulatory proceedings have been initiated by the subcommittee. The regulations may apply to new and existing sources in Colorado and should therefore be considered by the Army.

Response: The Army cannot consider standards which do not currently exist, or have not even been proposed at this time. Depending upon when any standards are subsequently promulgated, they may or may not be able to be considered within the context of this IRA.

Comment 4: CERCLA §120 provides that State officials will be provided the opportunity to participate in accordance with §121. Section 121 provides for substantial and meaningful involvement by each State in initiation, development and selection of remedial actions to be undertaken in that State. In its "Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements," 52 Fed. Reg. 32498 (August 27, 1987), EPA states "[w]here the requirements involves review by a State board based on explicit criteria, the best approach is to incorporate the substantive criteria into the RI/FS and remedy selection process and to maintain close consultation with appropriate State representatives" (emphasis added).

More recent guidance reiterates this point. EPA's "CERCLA Compliance With Other Laws Manual: Part II. Clean Air Act and Other Environmental Statutes and State Requirements." Page 2-14, OSWER directive 9234.1-02, provides,

Remedial Project Managers are responsible for identifying and complying with ARARs when proposed remedial actions could result in air emissions. In order to do so correctly and in a timely manner, each EPA Region should establish procedures, protocols, or memoranda of understanding that, while not recreating the administrative and procedural aspects of a permit, ensure early and continuous cooperation and coordination between the Regional Superfund and Air Program offices . . . State Superfund and State Air Program offices may be involved where there is a State-lead action of where the State has been delegated new source air permitting authority.

(emphasis added). As the Federal hazardous waste management program and Federal air program for incinerators have been delegated to the State of Colorado, the Army must maintain close consultation with appropriate state representatives regarding all aspects of planning and implementation of this treatment system. Accordingly, recommendations regarding compliance with these programs are included in the State's comments on the Proposed Decision Document. The State is looking forward to working closely with the Army to insure that program requirements are satisfied.

## Woodward-Clyde Consultants

Response: As reflected in the Draft Final Decision Document, the Army intends to work closely with the State and the other parties in the RMA CERCLA cleanup during implementation of this IRA.

### SPECIFIC COMMENTS

Comment 1: Page 9-1, para. 2: In the introduction to the ARARs section, the document states that "[t]he treatment process will not result in the release of any liquids to surface or ground water." The State relies upon the Army's commitment that there will be no such releases.

Response: Comment noted. No text change is necessary.

Comment 2: Page 9-2, para. 2: The document states that the Army's preferred alternative includes off-site disposal of solid residues. Since the Basin F liquids contain listed hazardous wastes, the treatment residues will require disposal as hazardous waste unless they can be delisted. See State Comment No. 4. The State relies upon the Army's commitment to dispose of the wastes off-site. Transportation to a duly permitted off-site disposal facility must be accomplished in a manner consistent with the requirements of the Colorado Hazardous Waste Management Act, and implement regulations such as 6 CCR 1007-3, pt. 262, subpart B (manifest requirements) and pt. 263 (transporter requirements).

Response: The Army specifically addresses the off-site disposal of incinerator residues under the Action-Specific ARARs Section.

Comment 2: Page 9-2, paragraph 3: This paragraph begins the document's section on air emissions. Consistent with CERCLA §120(f) (concluded) and the guidance cited in General Comment 5, the following air regulations should be considered by the Army, in addition to hazardous waste regulations in order to have substantial participation by the State.

- Common Provisions Section II.B. This section provides that the APCD may require continuous emission monitoring and the periodic reporting of data.
- Common Provisions, Section II.C. This section provides that the Division may require performance testing (stack testing) of any air contaminant source, and submission of written results to APCD.
- Common Provisions, Section II.E. This section provides reporting requirements for upset conditions.

Response: The State did not provide a General Comment 5. However, the matters reflected in this comment are more appropriate for evaluation in the design phase of this IRA.

Comment 3: Page 9-2, para. 3: The document states that the standards of 40 CFR pt. 50 (The National Primary and Secondary Ambient Air Quality Standards) were determined to be neither applicable nor relevant and appropriate to the IRA. Those standards are clearly applicable. The State relies upon the Army's commitment that "individual operating standards will be developed which will avoid adverse impacts on the ambient air quality in the region or which cause nonattainment of any ambient air standard. In addition, the document should be revised to reflect a significant State role in the

development of the individual operating standards and allowable emissions. See General Comment 5.

Response: The Draft Final Decision Document contains a detailed analysis of the reasons these ambient air standards are not appropriate to apply to a specific emissions source. Standards specific to this IRA treatment system are appropriately developed further into the process based upon detailed testing of the specific equipment intended to be used and the specific material to be destroyed. As noted above, the State made no General Comment 5.

Comment 4: Page 9-3, para. 2: the document states that from Colorado Regulation No. 1, provisions concerning sulfur dioxide are considered relevant and appropriate to the IRA. However, the document fails to include Colorado Regulations No. 7 in its ARARs analysis. This regulation pertains to Volatile Organic Compounds (VOCs) and should be identified as an ARAR for the Submerged Quench Incinerator spray dryer. The standard would also apply to any other emissions, caused by Basin F remedial activities, leaks or spills. Regulation 7, part V requires that Reasonably Available Control Technology (RACT) be used for disposal of VOCs.

Response: The spray dryer will be evaluated for air emissions. However, since the spray dryer will operate with the liquid brine which remains after at least 99.99% of the organics have been destroyed, it is highly unlikely any appreciable amounts of VOCs will remain in that liquid.

Comment 5: Page 9-4, para. 1: The document states that 40 CFR 61, subpart V the regulation pertaining to equipment leaks (fugitive emission sources) is considered relevant and

appropriate to apply to this IRA. The State is relying on the Army's commitment to meet the standards listed in subpart V.

Response: Comment noted. No text change is necessary.

Comment 6: Page 9-4, para. 2: The document states that the provision regarding mercury emissions in Colorado Air Pollution Control Regulation No. 8 is relevant and appropriate to the treatment system. The State agrees.

Response: Comment noted. No text change is necessary.

Comment 7: Page 9-5, para. 1: The document states the Colorado NSPS regulations are not applicable, relevant and appropriate because they involve processes "extremely dissimilar" to the Basin F treatment system. However, Colorado Regulation No. 6, Section III states that its NSPS requirements apply to all incinerators; it is therefore relevant and appropriate. Pursuant to this regulations, particulate emissions are limited to .10 grain per standard cubic foot (dscf) and opacity is limited to 20 percent per 6 minute interval.

Response: As discussed in the Draft Final Decision Document, the identified State standard for particulates was not reflected because it is not more stringent than the identified federal standard.

Comment 8: Page 9-5, para. 2: The document states that the process contained in 40 CFR pt. 270 (EPA Administered Permit Programs; Hazardous Waste Permit Program) is considered relevant and appropriate. The State is aware of a document that might offer further guidance to the Army regarding the

standard setting process. Although a "to be considered" (TBC), the California Air Resources Board's District Permit Guidelines for Hazardous Waste Incineration" offers further guidance regarding operating parameters. A copy of the document will be made available to the Army upon request.

Response: As always the Army appreciates the early identification of appropriate guidance documents for review. The State should be aware however that guidance documents are not always easily identified and available to Army staff. As soon as the State believes that a certain guidance document may be useful to the Army staff involved in remedial programs, the Army would appreciate the State's identification of such document and either providing a copy or making the document available for copying by the Army upon request. Early information sharing can only improve the planning process.

Comment 9: Page 9-5, para. 3 and page 9-6, para. 1: The document states that consistent with CERCLA and Executive Order 12580, "the trial burn plan and subsequent standard setting actions will be subject to EPA concurrence" and [a]fter the trial burn is is conducted, "Principal Organic Hazardous Constituents" [POHC's] will be established with the concurrence of EPA." (See State Comment 3.4.1 regarding the appropriate time for the establishment of POHC's.) The document must be revised to reflect the State's right to meaningful participation in this process.

Response: As reflected in the Draft Final Decision Document, the provisions of 40 CFR 270.62 requires the Army to submit a trial burn plan to EPA, consistent with the EPA role regarding Federal facilities as established by CERCLA and Executive Order 12580, the trial burn plan and subsequent

standard setting actions will be subject to EPA concurrence. However, the State and the other organizations will be given the opportunity to review and comment on this plan.

Comment 10: Page 9-6, para. 2: The document states that consistent with EPA guidance which requires that CERCLA remedial actions be protective of human health and the environment, the Army has committed to design and operate the system so as not to create a cumulative excess cancer risk higher than  $1 \times 10^{-6}$  (one in one million), or hazard index greater than 1 for noncarcinogenic compounds. The State is relying on the Army's commitment to meet these standards at a minimum.

Response: As stated in the Draft Final Decision Document, the Army has committed to this design goal.

Comment 11: Page 9-6, para. 2: The document states that the Army will consult with EPA, Shell, the Agency for Toxic Substances and Disease Registry, the Department of the Interior and the Colorado Department of Health concerning any modifications to the design and operating requirements for the system. The State relies upon the Army's commitment regarding participation of the Health Department before modification as substantial participation is required both under CERCLA 120(f) and implementing regulations. See General Comment 5.

Response: As noted previously, the State did not provide a General Comment 5. However, as noted in the Draft Final Decision Document, the listed parties will be consulted concerning any modifications to the design and operating requirements for this system.



Comment 12: Page 9-7, para. 1: The document states that prior to an actual departure from the CERCLA accepted risk range, the Army will issue an amended Decision Document for review and comment. However, the Army previously committed to a specific risk level. If revised requirements reflected an inability to achieve the  $10^{-6}$  risk level adopted by the Decision document an amended decision Document would need to be issued for review and comment rather than the issuance only upon a failure to meet the broader risk range of  $1 \times 10^{-6}$  through  $10^{-7}$ .

Response: While the Army is confident this design and operating goal can be attained by the selected technology, if final design and testing indicate difficulty in attaining this design and operating goal of  $1 \times 10^{-6}$  the Army will consult with EPA, Shell, the Agency for Toxic Substances and Disease Registry, the Department of Interior and the Colorado Department of Health concerning modifications necessary before proceeding further in the IRA process. After consultations, if it appears necessary to depart from the design and operating goal in a manner which is significant in terms of its effect on human health or the environment, the Army will issue an amended Decision Document for review and comment.

Comment 13: Page 9-7, para. 2: The document lists the EPA's six volume Waste Incineration Guidance Series as a "to be considered" (TBC). The State places reliance on the Army's commitment to consider the standards contained in these documents. Some of these requirements are more particularly set forth in the State's Comments on the Proposed Decision Document. See State Comments No. 3.4.2 and No. 3.4.3.

## Woodward-Clyde Consultants

Response: The State's comment is noted. The Army will consider the EPA six volume Waste Incineration Guidance Series.

Comment 14: Page 9-7, para. 3: The document states that although the Army does not anticipate that the IRA treatment system will be a major source or have significant emissions rates as defined by either State or Federal regulations, the Army will do an ARARs analysis for any source found to be a major source after the completion of the trial burn. In order to determine ARARs under the Clean Air Act (CAA) and the Colorado Air Quality Control Act (CAQCA), the ARAR should contain an analysis of the considerations listed below:

The ARARs document should determine whether the source constitutes a major or minor source for each compound emitted which is regulated under either CAA or CAQCA. In order to analyze the source, the ARAR document should include documentation of the presumed emissions presented in tons per year.

If the treatment method constitutes a major stationary source or a major modification, offsets would be required for nonattainment pollutants (carbon monoxide, and volatile organic compounds) emitted in significant quantities. In addition, controls which result in the Lowest Achievable Emission Rate (LAER) would be required.

Pollutants emitted in significant quantities for which the area is designated as attainment (such as  $\text{NO}_x$ ), must utilize Best Available Control Technology (BACT) as determined on a case by case basis and must not cause an increment or ambient air standard violation. More stringent requirements could apply to the source if it is classified as a major

stationary source. The requirements are contained in Regulation No. 3, Sections IV.D.2 and 3., which apply to nonattainment areas and attainment areas (PSD) respectively. The State relies upon the Army's commitment to do an ARAR analysis for any source found to be a major source under either Federal or State regulations.

Response: If this IRA treatment system is determined to constitute a major source after testing is complete, the regulatory provisions relevant to such sources will be reviewed to determine any additional ARARs.

Comment 15: Page 9-8, paras. 3 and 4: The document states, "[b]ased on where this treatment system will be located the Army believes that this IRA will have no adverse impacts on any endangered species or migratory birds or on the protection of wildlife habitats." The document contains a similar sentence regarding wetlands and the floodplain. It is unclear how the Army can represent that there will be no adverse impact when they have yet to locate the treatment system. However, the regulations described in these two paragraphs should clearly be met.

Response: The Draft Final Decision document addresses these considerations and their effect on site location and its relationship to wetlands and wildlife. The Army will coordinate with the U.S. Fish and Wildlife Service to ensure that no such adverse impact arises from the implementation of this IRA.

Comment 16: Page 9-9, para. 3: The document states that during the construction of the treatment system, there will be only a remote chance of any release of volatiles or semivolatiles into the air since the depth of excavation is not expected

to cause such a release. It is unclear how the Army can make this assertion without knowing the location of the treatment system, or the concentrations of contaminants present in soils at that location. Regardless of the Army's expectations, it must identify those standards which are ARARs, such as Colorado regulation No. 7, described at regarding VOCs.

Response: The Army disagrees with this comment. The Army does not believe Colorado Regulation No. 7 is applicable or relevant and appropriate to apply in the context of the construction of this IRA treatment system. However, it is unlikely that any treatment facility would be located in a contaminated area.

Comment 17: Page 9-10, para. 1: The document states that a site-specific health and safety plan will be developed after the treatment site selection, and that it will be available for review later in the IRA process. The State is relying on this commitment from the Army.

Response: As stated in the Final Decision Document and consistent with its practice in other IRAs, the Army will issue a site-specific health and safety plan.

Comment 18: Page 9-11, para. 2: The document states that certain State standards are not applicable because they do not "specifically address a remedial action or circumstance under CERCLA." However, the terms "applicable" in the phrase "applicable or relevant and appropriate requirements" is not limited to those requirements specifically addressing a CERCLA site. The NCP's definition of "applicable requirements" is "those Federal requirements that would be legally

## Woodward-Clyde Consultants

applicable, whether directly, or as incorporated by a federally authorized state program if the response actions were not undertaken pursuant to CERCLA section 104 or 106. Thus, "applicable" actually refers to those requirements that would govern independently of CERCLA, making the Army's interpretation of "applicable" contrary to the EPA's definition in the NCP.

Response: The Draft Final Decision Document was revised in response to this comment.

Comment 19: Page 9-15, para. 1: The document states that in the likelihood that an impact upon wetlands becomes probable, the Army will act in a manner consistent with regulatory provisions and appropriate guidance, and that the Army will coordinate with the U.S. Fish and Wildlife Service regarding wetland implications. The State is relying on the Army's commitment to meet these ARARs.

Response: Comment noted. No text change is necessary.

Comment 20: Page 9-15, para. 3: The document states that EPA is currently developing guidance pertaining to Land Disposal Restrictions, but the document does not list the EPA guidance available. Three documents which are "to be considered" (TBC's), are "Analysis of Treatability Data for Soil and Debris, Evaluation of Land Ban Impact on use of Superfund Treatment Technologies," OSWER directive 9380.3-04, "Land Disposal regulations and Applicable relevant and appropriate Regulations for RCRA Restricted Wastes," OSWER Directive, 9347.1-02, and "Policy for Superfund Compliance with Land Disposal Restrictions," OSWER directive 9347.1-02.

Response: See response to Specific Comment 9.

Comment 21: Page 9-15, para. 3: The document states that, "[i]f it is determined that a listed [hazardous] waste is present, the Army will act in a manner consistent with EPA guidance for the management of such in the context of CERCLA cleanup actions." The State's position is that the procedural as well as substantive provisions of the Colorado Hazardous Waste Management Act (CHWMA) apply to the management of hazardous waste. See General Comment 1. However, the State is relying on the Army's commitment to, at a minimum, manage listed waste in accordance with EPA guidance. It should be noted that a listed hazardous waste remains a hazardous waste until delisted. See State Comment 4.

Response: The Army disagrees that procedural provisions of the CHWMA apply to this IRA. EPA guidance clearly supports the Army's position. As stated in the Draft Final Decision Document, the Army will manage hazardous substances consistent with the EPA guidance then in effect for such actions at CERCLA sites.

Comment 22: Page 9-16, para. 2: The document states that "[f]or material determined to be hazardous waste, substantive RCRA provisions are applicable to their management." The State reiterates its position that the procedural as well as substantive provisions of the Colorado Hazardous Waste and Management Act (CHWMA) apply to the management of hazardous waste. See General ARAR Comment 1. At a minimum, the State is relying on the Army's commitment to meet the substantive standards. In addition, if a waste contains listed hazardous waste, it remains a hazardous waste until delisted. See State Comment 4.

Response: See response to State Specific Comment 22.

Comment 23: Page 9-16, para. 3: The document states that 40 CFR pt. 264, subpart J, pertaining to tank systems for hazardous wastes is considered relevant and appropriate. These standards are applicable. The State is relying on the Army to comply with these provisions.

Response: These regulations have been identified as relevant and appropriate in the context of this IRA and will be complied with.

Comment 24: Page 9-16, para. 5: This paragraph begins the section on Incinerator Operations. In deciding to conditionally accept the Army's preferred alternative, the State relied on the Army's commitment to meet all the ARARs set forth in this section as well as to consider the requirements set forth in EPA's Waste Incineration Guidance Series.

Response: Comment noted. No text change is necessary.

Comment 25: Page 9-17, para. 1: The document lists specific standards pertaining to hazardous waste incineration found in 40 CFR pt. 264. The State is relying on the Army's commitment to meet these ARARs. However, the Army has omitted several state standards that are more stringent than the Federal regulations and should therefore be identified as ARARs.

- Colorado regulations require treatment, storage and disposal facilities (TSD's) and generators to provide both classroom and on the job hazardous waste training to employees who handle hazardous waste. See 6 CCR 1007-3, §264.16(a).

- Colorado regulations prohibit the location of new treatment, storage, and disposal facilities within 1,000 feet of a fault which has had a displacement in Holocene time. See 6 CCE 1007-3, §264.18(a).
- Colorado regulations require treatment and storage facilities to be designed, operated, and closed in such a manner as to prevent washout by a 100-year flood event. New disposal facilities cannot be constructed in 100-year floodplains. See 6 CCR 1007-3, §264.18(b).
- Colorado regulations requires TSD's and generators to make hazardous waste preparedness and prevention arrangements with local health departments. See 6 CCR 1007-3, §264.37(a).
- Colorado regulations require TSD's and generators to design contingency plans to minimize releases to ground water. See 6 CCR 1007-3, §§264.51(a), 264.52(a).

Response: The Army has reviewed the regulations identified by the State and made appropriate modifications in the Draft Final Decision Document.

Comment 26: Page 9-17, para. 3: Although the document identifies Colorado Air Pollution Control Regulation No. 1 as relevant and appropriate and cites the sections on smoke and opacity, it does not mention the standards in Regulation No. 1 pertaining to particulate matter. The State has not yet adopted the Federal PM<sub>10</sub> standard but rather invokes the TSP standards. Therefore both the Federal and State standards apply as ARARs. The TSP standards is 150 ug/m<sup>3</sup> (24-maximum



concentration) and  $75 \text{ ug/m}^3$  (annual geometric mean). This standard is applicable at the property boundary and includes background concentrations as well as source impacts. The Army has also misstated the Federal standard for particulate matter. The correct Federal standard is 50 micrograms per cubic meter, not 75, as the Army states. The Federal standard also limits particulate emissions for a 24 hour average to 150 micrograms per cubic meter.

The document also fails to include Colorado Regulation No. 2 in its ARARs analysis. This section pertains to odor omissions. The Army's preferred treatment alternative, Submerged Quench Incineration, has the potential to emit odorous compounds, particularly ammonia. Therefore, this regulation should be included in the ARARs analysis. The standard requires that in predominantly residential or commercial area, odors must not be detected after the emissions have been diluted with seven or more volumes of odor-free air.

Response: The paragraph addressed by this comment discusses emissions from incinerator operations, for which a specific particulate standard is identified. The ambient air standards for particulates, as discussed in the Draft Final Decision Document is not relevant and appropriate to apply to this IRA treatment system as specific emissions limitations.

The State's Regulation No. 2 is identified as an ARAR in the Draft Final Decision Document.

Comment 27: Page 9-18, para. 1: The Army states, "Any residues from incinerator operations, such as brine or salts, will be

properly managed and disposed of . . . Any solids, such as salts, which remain after treatment and require disposal will be tested to determine whether they are hazardous wastes." The Basin F liquids contain listed hazardous wastes. Any residue from the incineration of Basin F liquids remains a listed hazardous waste unless delisted. See State Comment No. 4. Nevertheless, the State relies upon the Army's commitment to properly manage and dispose of the hazardous wastes, including temporary storage.

The document continues, "If determined to be hazardous, they will be properly manifested as required by 40 CFR Part 262 for off-site disposal in an authorized facility. If determined to be nonhazardous they will be disposed of in an appropriate facility approved for the disposal of such nonhazardous materials. Transportation of any hazardous waste off-site will be in accordance with 40 CFR Part 263, which is applicable."

The State places significant reliance on the Army's assurances to properly manage and dispose of the residues of the treatment process. Although the State believes that CHWMA/RCRA applies independently of the CERCLA action. Failure to meet the above substantive standards could result in withdrawal of State acceptance.

Response: Comment noted. No text change is necessary.

Comment 28: Page 9-18, para. 1: The document states that although the actual residue constituents cannot at present be definitively established, the Army promises to act consistent with EPA guidance regarding Land Disposal Restrictions. The State is relying on this commitment. See Specific Comment 18 for EPA guidance.

## Woodward-Clyde Consultants

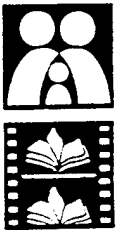
Response: Comment noted. No text change is necessary.

Comment 29: Page 9-19, para. 1: The document states that the IRA was prepared in substantive compliance with 40 CFR §1502.16, the regulations implementing the National Environmental Policy Act of 1969. The Army must also be in compliance with 32 CFR pt. 651 presently found at 53 Fed. Reg. 46322 (November 16, 1988) which are Department of Army regulations dealing specifically with NEPA requirements at CERCLA sites.

Response: The Army is proceeding consistent with the regulations at 32 CFR pt. 651.

APPENDIX A.3  
TRI-COUNTY HEALTH DEPT. - COMMENTS AND RESPONSES

---



# Tri-County Health Department

Serving Adams, Arapahoe and Douglas Counties

Hugh Rohrer, M.D., M.P.H.  
Director

January 31, 1990

Mr. Donald Campbell  
Deputy Program Manager  
Department of the Army  
Rocky Mountain Arsenal  
Commerce City, Colorado 80022-2180

Dear Mr. Campbell:

We have had the opportunity to review the Proposed Decision Document for Basin F Liquid Interim Response Action at Rocky Mountain Arsenal. Our particular focus was on health and safety issues. I would like to make the following comments based on that review.

Based on technical feasibility, economic analysis and the protection of health and safety, Tri-County supports the use of an on site remedy for disposal of Basin F liquids. We are particularly supportive of an incineration option, in order to meet the intent of Section 121(b)(1) of CERCLA, if health and environmental protection are not compromised. It is important that permanent reduction of volume, toxicity or mobility of hazardous substances be a high priority in the cleanup of hazardous waste sites in Colorado.

In our opinion, if submerged quench incineration were chosen as the treatment option for Basin F liquid, a dedicated facility should be constructed. Aside from concerns about offsite transport of hazardous liquid to a commercial facility, it is important that positive control of the incineration process be maintained by the Army and their contractors who will be directly accountable for all phases of implementing this IRA. This could most effectively be accomplished in a dedicated facility.

We support further investigation of the cleanup option proposed in the document and would ask that the following concerns be addressed.

1. Does the monitoring that is proposed include offpost measurements to establish background information on the selected chemicals that may be emitted from the process? We learned during the removal of Basin F liquid that additional offpost data would have been useful for comparison.

Mr. Donald Campbell  
January 31, 1990  
Page 2

2. What is the nature of the monitoring described to take place during the operation of the incinerator? Specifically, is it anticipated that direct reading instrumentation will be used? If not, what mechanism will be in place to quickly identify a malfunction and cause the process to shutdown? Will this be stack monitoring?

3. What parameters will be used to determine the need for process shutdown? Will they include process temperature, mixture and/or emissions?

4. What work has been done in the test burns to identify critical temperatures at which most efficient destruction of hazardous constituents takes place? At temperatures less than that are there other intermediate chemicals that may be formed? How will such information be used to control the treatment process?

5. Has the residual material (molten salt) been evaluated to determine what, if any, destructive effect it may have on the integrity of the incinerator, ie. reactivity, corrosivity etc.? What is the specific chemical composition of the salt residual?

We appreciate the opportunity to review and comment on this document. We encourage all parties to expedite the approval process so that final disposition of the Basin F liquids can begin.

Sincerely,



Chris J. Wiant, M.A., M.P.H.  
Director, Environmental Health Services

c.c. Ken Conright  
Adams County

CJW/

**RESPONSE TO COMMENTS OF TRI-COUNTY HEALTH DEPARTMENT  
ON PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID DISPOSAL**

Comment 1: Does the monitoring that is proposed include off-post measurements to establish background information on the selected chemicals that may be emitted from the process? We learned during the removal of Basin F liquid that additional off-post data would have been useful for comparison.

Response: More specific details for the ambient air monitoring program will be supplied in the Draft Implementation Document. It is typical to establish background concentrations in order to assess the contribution of an emission source as part of a monitoring program. We believe that some of this information already exists from past Basin F related activities.

Comment 2: What is the nature of the monitoring described to take place during the operation of the incinerator? Specifically, is it anticipated that direct reading instrumentation will be used? If not, what mechanism will be in place to quickly identify a malfunction and cause the process to shutdown? Will this be stack monitoring?

Response: The monitoring to take place during the incinerator operation will be that necessary to ensure protection of human health and the environment. It is anticipated that direct reading and continuous monitoring instrumentation will be used within the facility and at the stack to monitor key process parameters and certain compound emissions. This instrumentation will be part of an interlock cutoff system that will ensure that at no time will the incinerator

operate outside of the established operating requirements. The details on this monitoring system will be supplied as part of the Draft Implementation Document.

Comment 3: What parameters will be used to determine the need for process shutdown? Will they include process temperature, mixture and/or emissions?

Response: The specific parameters to determine the need for process shutdown will be developed in the design phase and presented in the Draft Implementation Document. These parameters will adhere to the hazardous waste incinerator guidelines established by the U.S. Environmental Protection Agency. These guidelines establish the minimum parameters that must be monitored according to regulations for hazardous waste incinerators. These include combustion gas flow rate, waste feed rate, carbon monoxide emissions, and certain process parameters, such as pressure drop for the air pollution control equipment.

Comment 4: What work has been done in the test burns to identify critical temperatures at which most efficient destruction of hazardous constituents takes place? At temperatures less than that are there other intermediate chemicals that may be formed? How will such information be used to control the treatment process?

Response: A treatment evaluation test was performed at the T-Thermal Inc. facility in February 1989 to collect information on the incineration of Basin F liquid. During this test the temperature was varied in order to determine what temperature gives best destruction of organics and minimizes



stack emissions (CO, NO<sub>x</sub>). This information, along with information obtained from predesign testing, will be used to design the full-scale SQI system. Optimum operating conditions of the full-scale system will be established during the trial burn. Please refer to the "Test Report" by T-Thermal for treatment evaluation test results.

Comment 5: Has the residual material (molten salt) been evaluated to determine what, if any, destructive effect it may have on the integrity of the incinerator, i.e. reactivity, corrosivity, etc.? What is the specific chemical composition of the salt residual?

Response: The residual material from SQI is a brine containing salts, metals, and trace quantities of nonpriority pollutant organics. This material will have some corrosive effect on the incinerator refractory. The specific chemical analysis of the brine can be found in the "Test Report, Treatability Test of Basin F liquid using submerged quench Incineration" submitted by T-Thermal, Inc. in July 1989. The salt residue from the spray drying process will be a relatively dry salt containing the same metals and trace nonpriority pollutant organics.

APPENDIX A.4  
U.S. DEPT. OF INTERIOR/FISH AND WILDLIFE SERVICE - COMMENTS AND RESPONSE

A.4-1



## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
FISH AND WILDLIFE ENHANCEMENT  
ROCKY MOUNTAIN ARSENAL FIELD OFFICE  
BUILDING 111  
COMMERCE CITY, COLORADO 80022-2180



IN REPLY REFER TO:

January 29, 1990

Donald L. Campbell  
Deputy Program Manager  
Rocky Mountain Arsenal  
Building 111  
Commerce City, CO 80022-2180

Dear Mr. Campbell,

The Service has reviewed the Proposed Decision Document for the Basin F liquid Interim Response Action (IRA) at Rocky Mountain Arsenal. We do not have any technical concerns related to protection of fish and wildlife at this time since the projected action will not result in a discharge to surface waters and the residual solids will be disposed of offpost. However, the Service requests additional consultation with your office in the choice of an operating site. The process of site location and eventual field operations (construction and processing) should be closely reviewed to ensure the protection of fish and wildlife resources at the Arsenal.

Sincerely,

Donald R. Gober  
RMA Coordinator

**RESPONSE TO COMMENTS OF U.S. DEPARTMENT OF INTERIOR  
ON PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID DISPOSAL**

Comment 1: The Service has reviewed the Proposed Decision Document for the Basin F liquid Interim Response Action (IRA) at Rocky Mountain Arsenal. We do not have any technical concerns related to protection of fish and wildlife at this time since the projected action will not result in a discharge to surface waters and the residual solids will be disposed of off-post. However, the Service requests additional consultation with your office in the choice of an operating site. The process of site location and eventual field operations (construction and processing) should be closely reviewed to ensure the protection of fish and wildlife resources at the Arsenal.

Response: The Fish and Wildlife Service will be invited to comment on the selected location for the treatment plant. The Army will attempt to minimize the impact on Arsenal wildlife resources while meeting our site selection objectives of minimizing off-post health and on-post transportation risks.

APPENDIX A.5  
SHELL OIL COMPANY - COMMENTS AND RESPONSE

---

A.5-1

Shell Oil Company



One Shell Plaza  
P.O. Box 4320  
Houston, Texas 77210

January 29, 1990

Office of the Program Manager for Rocky Mountain Arsenal  
ATTN: AMXRM-PM: Mr. Donald L. Campbell  
Rocky Mountain Arsenal, Building 111  
Commerce City, Colorado 80022-2180

Dear Mr. Campbell:

Enclosed herewith are Shell Oil's comments on Proposed Decision Document,  
Basin F Liquid Disposal IRA.

Sincerely,

A handwritten signature in dark ink, appearing to read "G. E. Roe".

G. E. Roe  
Technical Manager  
Denver Site Project

/ajg

Enclosure

cc: (w/enclosure)  
Office of the Program Manager for Rocky Mountain Arsenal  
ATTN: AMXRM-PM: Col. Daniel R. Voss  
Bldg. E-4460  
Aberdeen Proving Ground, MD 21010-5401

Office of the Program Manager for Rocky Mountain Arsenal  
ATTN: AMXRM-IA: Mr. Enge Dressler  
Rocky Mountain Arsenal, Building 111  
Commerce City, CO 80022-2180

Office of the Program Manager for Rocky Mountain Arsenal  
ATTN: AMXRM-RP: Mr. Kevin T. Blose  
Rocky Mountain Arsenal, Building 111  
Commerce City, CO 80022-2180

**RESPONSE TO COMMENTS OF SHELL OIL COMPANY  
ON PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID DISPOSAL**

**GENERAL COMMENTS**

Comment 1: As stated in the January 11, 1990 public meeting, Shell agrees with the selection of submerged quench incineration for this IRA.

Comment 2: Shell will supply the Army further information on brine disposal/metals recovery options, in a separate communication, to assist in the Army's decision regarding SQI residual treatment. It is our hope that this added information will allow a timely decision, and be reflected in the final version of the decision document.

Response: The Army acknowledges receipt of this information dated January 25, 1990. After consideration of this information and the comments of the EPA and the Colorado Department of Health, the Army disagrees with Shell and will proceed with on-site spray drying with off-site disposal for management of SQI residuals. (See Response to EPA General Comment 1.)

Comment 3: In various places in the text the Army states that the incinerator will be either "decommissioned" or "decommissioned and disassembled" after treatment of Basin F liquid is completed. Shell believes it is important to commit that this incinerator will not be used for non-Arsenal wastes, but it would be inappropriate to exclude the potential future use of this incinerator for remediation of other Arsenal wastes. We recommend rewording to reflect this.

Response: The incinerator will be shut down and thoroughly cleaned following completion of treatment of Basin F liquids and other process-generated waters from the Basin F IRA. Furthermore, the Army has committed that the incinerator would not be used for non-Arsenal wastes, that is, no wastes would be imported to RMA from other locations for incineration in this equipment. However, based on the outcome of the 1993 Record of Decision, some of the equipment may be suitable for processing other aqueous streams or liquid wastes that result from future remedial activities at the Arsenal. Any later utilization of the incineration would only occur after appropriate public notification and comment. The text has been changed to reflect this.

**SPECIFIC COMMENTS**

Comment 1: The first paragraph of page 1-1 references a two-part interim response action, for "...soils and liquid..." while on page 2-2 sludges are included with soils. The latter wording is consistent with the FFA.

Response: The text has been changed to reflect wording consistent with the FFA.

Comment 2: The next to last sentence of page 1-1 should be reworded to clarify that the length of temporary storage (5 years) is set by the service life of the storage tanks. See paragraph 22.3 (h) of the FFA. The TPP also mentions service life of the tanks (3.3.2.1).

Similar clarification is needed on page 2-2, third full paragraph, and at the top of page 4-4.



Similar clarification is also needed at the bottom of page 5-2.

Response: The text has been changed to reflect wording consistent with the Federal Facility Agreement (FFA) and Technical Program Plan (TPP).

Comment 3: Page 2-1, first paragraph, last sentence - Remove "and herbicides" since this is included within the definition of pesticides.

Response: The text has been changed.

Comment 4: Page 2-1, second paragraph - December 1983 should be 1982.

Response: The text has been changed.

Comment 5: Page 2-2, second paragraph, third line - Change "finalized" to "entered by the court."

Response: The text has been changed.

Comment 6: On page 2-2, the second full paragraph, first sentence - the FFA indeed specified thirteen interim response actions to be necessary and appropriate (paragraph 22.1). However, whether an individual IRA is to remove contaminants, prevent the spread of contaminants, or, after assessment, take no further action, is dependent on the circumstances of each IRA. Recommend modifying by ending the first sentence after "appropriate" and removing "...to remove...contaminants."

Response: The text has been changed.

Comment 7: Page 3-1 mentions "...Pilot-scale or subsequent testing..." while the third bullet on page 6-1 says "...could proceed directly..." The steps shown on page 6-4 do not include pilot testing but do include a trial burn. Suggest that these and other similar spots in the text be made consistent. A trial burn will definitely be a requirement, but the need for further pilot testing will not be clear until the scale-up capabilities of the selected design contractor are known.

Response: The text in the decision document has been modified to correct these inconsistencies. The implementation steps on page 6-4 include a design process and a full-scale trial burn. Any additional predesign testing will be performed prior to the design process. The Army agrees that a full-scale trial burn will be required. The full-scale trial burn requirements are outlined in Section 9.0 of the document.

Comment 8: Similarly, the management of salts, either as brine, as solid, or as something yet to be determined, is worded differently at various spots in the text and needs to be clarified and made consistent (e.g., third paragraph of page 6-3). We realize that as of the issuance of the draft this decision has not been made, as noted in General Comment 2.

Response: The Army has reached a decision to manage the residuals as a salt and has received EPA concurrence on this decision. The text of the Final Decision Document has been changed to reflect this decision.

## Woodward-Clyde Consultants

Comment 9: Page 3-1, second paragraph, third line - These are criteria rather than objectives. It would be clearer if these were referred to as a set of screening criteria.

Response: The text has been changed.

Comment 10: Page 3-1, final paragraph, first line - For clarity, these should be referred to as a set of selection criteria.

Response: The text has been changed.

Comment 11: Page 3-2, third bullet - Change "and" to "or".

Response: The text has been changed.

Comment 12: Page 4-2, first paragraph, second line - Change "and" to "or".

Response: The text has been changed.

Comment 13: The first full paragraph of page 4-5 would be clearer if "...20 tank trucks per month..." were modified by removing the "...per month..."

Response: The text has been changed.

Comment 14: The use of consistent volumetric units (cubic yards) for wastes, chemicals, etc., is a good idea to help the general public understand relative amounts of potential truck or rail traffic, even if awkward and unrealistic to those more familiar with the units used commercially. A summary table, with multiple units, would be even better, and eliminate the need for page-flipping to make comparisons.

Response: With the exception of the use of gallons (of Basin F liquid) in Chapters 1 and 4, all units are cubic yards. The use of gallons in Chapter 1 is appropriate because it is consistent with all past references to the amount of Basin F liquid to be treated. The use of gallons in Chapter 4 refers to the capacity of tanker trucks and rail cars, and is appropriate because these are the units normally used to describe trucks and rail cars. No change to the Decision Document has been made.

Comment 15: Page 4-7, second full paragraph; page 4-9, first full paragraph - "The exhaust gases would include a mixture of oxides of nitrogen and other gases." This statement gives the impression that nitrogen oxides are the major component and should therefore be reworded.

Response: Text has been changed to read, "combustion by-products and other gases."

Comment 16: Page 4-9, second full paragraph - Metals recovery for the SQI residual is done before drying, if it is to be done, in the processes of which we are aware.

Response: Text has been changed to read, "The submerged quench incineration and spray drying processes would produce salts, of about 25 percent of the original volume of the Basin F liquid. These salts, which contain metals, could be disposed of in an off-site hazardous waste landfill.

Comment 17: Page 4-10, second full paragraph - According to the Treatment Assessment Report, sodium hydroxide is not needed for the Wet Air Oxidation with the Spray Drying Option.

Response: Sodium hydroxide was included as a potential chemical to further treat the exhaust gases.

Comment 18. At the top of page 4-15, the liquid more accurately contains ammonium salts and other nitrogen-containing compounds, that may decompose to release ammonia gas when pH is changed or other materials added, rather than being saturated with ammonia gas.

Response: Comment noted. The text has been changed to read, "... Basin F liquid is almost completely saturated with ammonium salts and other nitrogen-containing compounds."

Comment 19: Section 4.2.5 conveys an impression of a very mechanical "cookbook" approach, that follows from hard, mandatory EPA Procedure, rather than EPA Guidance. EPA Guidance has a historical underlying intent to be flexible to fit different situations and to be biased toward timely decision-making (and therefore earlier actions) via responsible professional judgments.

Response: Section 4.2.5 refers to CERCLA guidance and the NCP. The evaluation method and ranking approach used in the Treatment Assessment were structured around the criteria listed in the NCP; these are the same criteria presented in EPA guidance. The NCP is understood to stipulate "hard, mandatory procedure", at least insofar as the specific evaluation criteria to be used in remedy selection are concerned. The observation on the historical intent of EPA guidance is appreciated.

## Woodward-Clyde Consultants

Comment 20: Page 5-1 -

- December 1983 should be December 1982.
- It is suggested that the June 5, 1987 filing with the court, by which the United States, Shell, and the State agreed to the list of IRA's be included.
- Third line of the March 1988 entry, "double-lined" should be deleted before "storage tanks."

Response: The text has been changed in response to these comments.

Comment 21: Page 6-1, first paragraph, first line - Recommend changing "destroy Basin F liquids" to "treat Basin F liquids."

Response: The text has been changed.

Comment 22: Page 6-1, first paragraph; page 6-5, Design Measures, first item - The selection of a treatment site will depend on a variety of factors, including highway and rail access, etc. The risk assessment for this alternative has shown that both carcinogenic and noncarcinogenic risks are extremely small, even on the Arsenal. Shell recommends rewording to present a more accurate balance of the issues involved, and to respond to traffic congestion concerns.

Response: The focus on health risks is a direct response to expressed public concerns about the location of the treatment facility. The wording of the Decision Document, however, has been changed to include mention of other issues, including traffic congestion.

## Woodward-Clyde Consultants

Comment 23: Page 6-4, first line - Recommend replacing "destroy" with "treat".

Response: The text has been changed.

Comment 24: The second bullet on page 5-5 (closure of storage tanks and pond) could become a major problem in view of the history of Basin F solids handling, i.e., the sludge, settled salts, etc., contained. Recommend adding words to the first paragraph on page 6-3 to address this in feed system design via recirculation/suspension/jet mixers or other means.

Response: The first paragraph on page 6-3 has been changed to include this sentence, "A feed system design which incorporates recirculation suspension/jet mixers or other means will be evaluated in the design phase."

Please refer to the response given to EPA Specific Comment 5.

Comment 25: Page 6-5, third bullet - See General Comment 3.

Response: This wording is consistent with the commitment made by the Army, and leaves open the possibility that the incinerator might be used for other RMA wastes, subject to a subsequent treatment assessment through the Record of Decision and full public involvement. "Decommissioning" does not imply disassembly. No changes have been made to the Decision Document.

Comment 26: Page 6-6, item 5, last sentence - The worst-case weather conditions have already been taken into account during the risk assessment. It is unclear whether this sentence is a

commitment to shut down during weather-caused operating upsets. If so, we concur but recommend clarification, by including a statement that operational judgement will also be used to consider the potential of added emissions from the shutdown/restart procedure.

Response: The Army concurs with Shell's comment, and the wording of the Decision Document has been revised to include mention of the shutdown/restart emissions.

Comment 27: Page 6-8, item 11 - Should more specifically reference the appropriate part of section 9. At this point it is assumed to be the trial burn process described on page 9-6.

Response: Item 11 on Page 6-8 addresses emissions of products of incomplete combustion (PICs). These emissions will be characterized as part of the full-scale trial burn program. These data will be utilized in the standard-setting process for air emissions in Section 9.0. The text in Section 9.0 will be revised to indicate this.

Comment 28: Page 6-8, item thirteen - See General Comment 3.

Response: The Army understands Shell's concern, and has changed the wording of the Decision Document to delete disassembly, and add wording to describe the general conditions under which the incinerator might be used in the future to treat other RMA wastes.

Comment 29: Page 10-1, first paragraph - See comment 7 regarding pilot testing.



Response: The text in the decision document has been changed to eliminate the inconsistent nomenclature usage. See Response to Comment 7.

Comment 30: Page 11-1, second paragraph - Recommend replacement of "destruction" with "treatment".

Response: The text has been changed and now reads, "treatment of the entire liquid waste body."

Comment 31: Page 11-1, second paragraph - Recommend replacement of "destroys" with "treats".

Response: The text has been changed.

# Holme Roberts & Owen

Suite 400  
102 North Cascade Avenue  
Colorado Springs, Colorado 80903

Suite 900  
50 South Main Street  
Salt Lake City, Utah 84144

Edward J. McGrath

## Attorneys at Law

Suite 4100  
1700 Lincoln

Denver, Colorado 80203

Telephone (303) 861-7000  
Telecopier 866-0200  
Telex 45-4460

Denver Technological Center  
Suite 900  
8400 East Prentice Avenue  
Englewood, Colorado 80151

Suite 400  
1401 Pearl Street  
Boulder, Colorado 80302

January 29, 1990

Mr. Donald L. Campbell  
Office of the Program Manager  
for Rocky Mountain Arsenal  
ATTN: AMXRM-PM: Mr. Donald L. Campbell  
Rocky Mountain Arsenal, Building 111  
Commerce City, Colorado 80022-2180

Re: Shell Oil Company Comments on ARARs  
Evaluation in the Proposed Decision  
Document for the Basin F Liquid IRA

Dear Mr. Campbell:

This document constitutes the Shell Oil Company  
Comments on the ARARs Evaluation in the Proposed Decision  
Document for the Basin F Liquid IRA, dated December 28, 1989.

Shell reiterates its comment regarding Subpart V  
(NESHAPs for equipment) and recognizes the Army response to  
our comment that "[i]f later test data reflects that it would  
be unreasonable to apply Subpart V as an ARAR to the specific  
equipment involved in the IRA treatment process, the Army will  
reconsider this determination."

Shell supports the trial burn process for  
establishing standards and reserves the right to comment on  
specific standards proposed during the process.

The Army has proposed a design and operating  
requirement for this system such that there will be created no  
cumulative risk higher than  $1 \times 10^{-6}$  of excess cancer  
incidence. The proposed NCP establishes risk ranges of  $10^{-4}$   
to  $10^{-7}$  as acceptable individual risk ranges. 53 Fed. Reg.  
51,441 (Dec. 21, 1988). Shell urges the Army to develop  
design and operating requirements for the entire range, not  
only the  $1 \times 10^{-6}$  risk of excess cancer incidence. It also

Mr. Donald L. Campbell  
January 29, 1990  
Page 2

suggests that an analysis be based on the actual duration planned for the incinerator of 17 months, in addition to an analysis based on two years duration.

Shell reserves the right to comment on how any guidance regarding the land disposal restrictions would be applied in the context of this IRA. It hereby incorporates comments submitted on the Supplemental Notice and Request for Comment Regarding the Applicability of Land Disposal Restrictions to CERCLA Response Actions (54 Fed. Reg. 41,566 (Oct. 10, 1989)), which were attached to our December 22, 1989 Comments on the Proposed Decision Documents for M-1 Settling Basins, Motor Pool Area, Rail Classification Area, and Lime Settling Basins.

Very truly yours,

*Edward J McGrath/cw*

Edward J. McGrath

EJM:hs

cc: Colonel Daniel R. Voss  
Office of the Program Manager for Rocky Mountain Arsenal  
ATTN: AMXRM-PM  
Commerce City, Colorado 80022-2180

Mr. David Parks  
Interim Response Division  
Office of the Program Manager for Rocky Mountain Arsenal  
ATTN: AMXRM-IA  
Commerce City, Colorado 80022-2180

Mr. Brian L. Anderson  
Technical Operations Division  
Office of the Program Manager for Rocky Mountain Arsenal  
ATTN: AMXRM-TO  
Commerce City, Colorado 80022-2180

Bradley S. Bridgewater, Esq.  
Department of Justice  
999 - 18th Street  
Suite 501, North Tower  
Denver, Colorado 80202

Mr. Donald L. Campbell  
January 29, 1990  
Page 3

VIA FEDERAL EXPRESS:

Major Lawrence E. Rouse  
U.S. Army Environmental Law Division  
655 15th Street, N.W., Suite 930  
Washington, DC 20005

Victoria L. Peters, Esq.  
Office of Attorney General  
CERCLA Litigation Section  
1560 Broadway, Suite 250  
Denver, Colorado 80202

Mr. Jeff Edson  
Hazardous Materials and Waste Management Division  
Colorado Department of Health  
4210 East 11th Avenue  
Denver, Colorado 80220

Mr. Robert L. Duprey  
Director, Hazardous Waste Management Division  
U.S. Environmental Protection Agency, Region VIII  
One Denver Place  
999 - 18th Street, Suite 500  
Denver, Colorado 80202-2405

Mr. Connally Mears, Director  
Air and Waste Management Division  
U.S. Environmental Protection Agency, Region VIII  
One Denver Place  
999 - 18th Street, Suite 500  
Denver, Colorado 80202-2405

Mr. Thomas P. Looby  
Assistant Director  
Colorado Department of Health  
4210 East 11th Avenue  
Denver, Colorado 80220

RESPONSE TO SHELL OIL'S COMMENTS  
ON THE APPLICABLE OR RELEVANT AND  
APPROPRIATE REQUIREMENTS FOR THE  
BASIN F LIQUID IRA

- Comment 1: Shell reiterates its comment regarding Subpart V (NESHAPs for equipment) and recognizes the Army response to our comment that "[i]f later test data reflects that it would be unreasonable to apply Subpart V as an ARAR to the specific equipment involved in the IRA treatment process, the Army will reconsider this determination."
- Response: Comment noted. No text change is necessary.
- Comment 2: Shell supports the trial burn process for establishing standards and reserves the right to comment on special standards proposed during the process.
- Response: As discussed in the Final Decision Document, Shell and the other parties will be provided opportunities to comment during the standard setting process.
- Comment 3: The Army has proposed a design and operating requirement for the system such that there will be created no cumulative risk higher than  $1 \times 10^{-6}$  of excess cancer incidence. The proposed NCP establishes risk ranges of  $10^{-4}$  to  $10^{-7}$  as acceptable individual risk ranges. 53 Fed. Reg. 51, 441 (December 21, 1988). Shell urges the Army to develop design and operating requirements for the entire range, not only the  $1 \times 10^{-6}$  risk of excess cancer incidence. It also suggests that an analysis be based on the actual duration planned for the incinerator of 17 months, in addition to an analysis based on two years duration.

## Woodward-Clyde Consultants

Response: Consistent with the proposed NCP, 53 Fed. Reg. 51, 441 (December 21, 1988) also provides that the cumulative risk higher than  $1 \times 10^{-6}$  is to be used as a point of departure for determining remediation goals. The Army's design goal is to attain this level of risk for treatment operations. The two year duration used in the analysis is a conservative approach, but considered appropriate in the context of the IRA.

Comment 4: Shell reserves the right to comment on how any guidance regarding the land disposal restrictions would be applied in the context of this IRA. It hereby incorporates comments submitted on the Supplemental Notice and Request for Comment Regarding the Applicability of Land Disposal Restrictions to CERCLA Response Actions (54 Fed. Reg. 41,566 (October 10, 1989)), which were attached to our December 22, 1989 Comments on the Proposed Decision Documents for M-1 Settling Basins, Motor Pool Area, Rail Classification Area, and Lime Settling Basins.

Response: As Shell is aware, guidance, in this area is under development. The Army will act consistently with EPA guidance concerning this issue.

APPENDIX A.6  
NATIONAL TOXICS CAMPAIGN - COMMENTS AND RESPONSE

---

A.6-1

Received 1/30/90  
EC

# THE NATIONAL TOXICS CAMPAIGN

working to solve America's environmental crisis



Jan. 30, 1990

U.S. Army Materiel Command  
Attn: Mr. Donald Campbell  
Program Manager for RMA.  
Building III, Rocky Mountain Arsenal  
Commerce City, CO 80022-2186

Dear Mr. Campbell:

Here are the comments and questions of the National Toxics Campaign's Colorado Office regarding the proposed Submerged Quench Incinerator alternative for the Basin F liquid Interim Response Action.

Please inform us when the response to these comments and questions are done.

Thank you.

Sincerely,

Philip Hufferd

Director, Colorado Outreach Program  
National Toxics Campaign

Printed on recycled paper

303-331-9114

National Office  
Temple Place  
Boston, Mass. 02111  
(617) 482-1477

Western Regional Office  
P.O. Box 6057  
Denver, Colo. 80206  
(303) 333-9714

Northeast Regional Office  
P.O. Box 955  
Orland Spring, Maine 04272  
(207) 926-3424

Southern Regional Office  
P.O. Drawer 1526  
Birmingham, Alab. 35470  
(205) 652-9854

West Coast Office  
700 H Street  
Sacramento, Cal. 95816  
(916) 446-3350

Texas Office  
400 Montrose Street #909  
Houston, Texas 77006  
(713) 529-8038

Oklahoma Office  
1000 United Founders Blvd. #125  
Oklahoma City, OK 73112  
(405) 843-3249

North Carolina Office  
19 B. Oberlin Road  
Raleigh, N. Carolina 27605  
(919) 828-5539

Washington, D.C. Office  
P.O. Box 28171  
Washington, D.C. 20005  
(202) 291-0863

California Office  
P.O. Box 1447  
Richmond, Cal. 94801  
(415) 232-3427

New Hampshire Office  
22 Main Street  
Nashua, New Hampshire 03079  
(603) 894-6447



**RESPONSE TO COMMENTS OF NATIONAL TOXICS CAMPAIGN  
ON PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID DISPOSAL**

Comment 1: In the U.S. Army Materiel Command's (USAMC) "Fact Sheet Notes on Chemicals in Basin F Liquid", polynuclear aromatic hydrocarbons, pesticides, and PCBs are all described as semivolatile compounds. This designation is incorrect. The inability of the USAMC to demonstrate a rudimentary understanding of chemical data does not reflect well on their ability to monitor their own activities.

Response: We disagree with your comment that these compounds should not be designated as semivolatile. Basin F liquid was analyzed for base-neutral and acid compounds by gas chromatography/mass spectrometry, EPA test Method 8270 (United States Environmental Protection Agency, Office of Solid Waste and Emergency Response, SW-846, July 1982). Method 8270 includes polynuclear aromatic hydrocarbons, pesticides, and PCBs, as listed in the "Fact Sheet-Notes on Chemicals in Basin F Liquids." The operational definition of semivolatile organic compounds in Method 8270 includes organic compounds that are soluble in methylene chloride and are capable of being eluted without derivation as sharp peaks from a gas chromatograph fused-silica capillary column coated with a slightly polar silicone. For general categorization of these compounds in the fact sheet, we used the U.S. EPA's operational definition.

Comment 2: In the same fact sheet, the reported detection limits for some of the pesticides, PCBs, and base/neutral extractable compounds are in the 380 to 8,800 ppb range. These detection limits MUST be improved upon before the Basin F liquids can be called adequately characterized.

Response: For this analysis of Basin F liquid, the sample extract had to be diluted by a factor of 200. The reported practical quantitation limits (PQLs) were based on a 200 to 1 dilution factor and do not represent the method detection limits. The EPA method used to determine these compounds, 8270, is the best general analysis that could be conducted. The reported PQLs for the EPA method used were proportionately higher for the diluted sample extract. As stated, a 200 to 1 dilution of the Basin F liquid was required for successful analysis. To perform a successful analysis, this dilution was necessary for the analytical instrument to perform in its normal working range of sensitivity as well as to minimize matrix interference.

It should be noted that the Army will have much lower detection levels for air monitoring because it is a less complicated analysis. We believe that directing our analytical efforts toward air monitoring is more responsible to public health than attempting to lower detection levels for Basin F liquid analysis.

Comment 3: In the T-Thermal "Test Report 1 Million BTU/Hour Pilot Plant Study for Morrison Knudsen Engineers on RMA Basin F Liquid" (herein after referred to as the test report), on page 22 of the first section, it is noted that build up of molten salts clogged the atomizer nozzle tip by which the Basin F liquid is injected into the SQI. This clogging leads not only to an increase of CO (carbon monoxide) emissions as noted in the test report, but the release of unburned hydrocarbons increases also as atomization efficiency is reduced by the molten salt build up. Steam cleaning was used to clean the atomizer tip. How will this be monitored? What will be the

steam cleaning schedule for the tip? How will this procedure be documented?

Response: The T-Thermal treatment evaluation tests, referred to in this comment, were run on existing SQI equipment that was not specifically designed for treatment of Basin F liquids. The on-site incinerator will be designed specifically for treating Basin F liquids. Optimization of the waste atomization nozzle delivery system will be given priority early in the design portion of the project and in predesign testing. Subsequent monitoring and performance criteria will be established to ensure consistent incinerator performance that complies with all applicable regulations. Public assurance that the monitoring of nozzle performance and cleaning, as necessary, is being correctly performed will be through independent oversight by the EPA and Colorado Department of Health (please refer to the response given to the State's General Comment 3).

Comment 4: On page 10 of the first part of the test report it is noted that only the liquid portion of the contents of the barrels containing the Basin F liquid sent for testing to the T-Thermal facility in Pennsylvania was used in the test. The solid salt component, ranging from 10% to 50% per barrel, was discarded. This was improper procedure; the solid salt component should have been homogenized into the liquid fraction to give a realistic indication of the combustion products, assuming that the solid salt component of the Basin F liquid is to be incinerated during the proposed IRA. If the solid salt component, or fraction, of the Basin F liquid is to be incinerated, then the results of the T-Thermal test incineration are not valid indicators of combustion products, waste products, emissions, or operating

conditions that would exist with solid salt as well as liquid incineration.

Response: The feed to the T-Thermal test Incinerator used for treatment evaluation was characteristic of the feed that will be processed by the full-scale facility. In fact, in the full-scale facility there will be some salts that will not be processed. The Decision Document wording has been modified to clarify that a feed system design which incorporates recirculation, suspension, jet mixers, or other means will be evaluated in the design phase. All residue that can be dissolved or suspended will be fed to the SQI. Any residue or crystals which remain insoluble will not be fed to the SQI, but will be addressed by the final Record of Decision or a subsequent IRA phase, if necessary.

Comment 5: Is the solid salt fraction of the Basin F liquid to be incinerated along with the liquid fraction after some sort of homogenizing process?

Response: As described in our response to Comment 4, an attempt will be made to dissolve or suspend the solid salt fraction. The Army anticipates that some solid salt fraction will still remain after this attempt. That remaining solid fraction will not be incinerated, but will be addressed by the final Record of Decision or a subsequent IRA phase, if necessary.

Comment 6: If the solid salt fraction is not to be incinerated, then what is to be done with the solid salt residue? How is it to be treated?

Response: Please refer to responses given for Comments 4 and 5 above.

Comment 7: What is the composition of just the solid salt fraction? What is the composition of the substances created by the treatment method, including any of its emissions?

Response: The available information in reference to composition of products and the anticipated air emissions resulting from the SQI treatment are referenced in the SQI treatment evaluation test report, "Treatability Test of Basin F Liquid Using Submerged Quench Incinerator," submitted by Shell Oil Company, 1989.

In summarizing the results of this T-Thermal report, it should be emphasized that no "new" substances were "created" by the treatment method. As anticipated, analytical results indicated that compounds in the Basin F liquid fed to the SQI were broken down into simpler compounds. Stack emissions were analyzed by U.S. EPA Method 12 and Modified Method 5 for organic compounds, particulates, and metals. The quench liquid, or brine left after the incineration of Basin F liquid, was analyzed by U.S. EPA Methods 624 and 625 for volatile and semivolatile organic compounds and by U.S. EPA Methods 200.7 and others for metals and anions.

Important findings of the analytical tests included the detection of low levels of hydrochloric acid (HCl) and total particulates in SQI stack emissions; these levels were well below the U.S. EPA standards for HCl and particulates in emissions. Calcium, sodium, potassium, and copper were detected at low levels in the emissions, with all other metals either not detected or present at trace levels. Organic compounds detected in the emissions included trace levels (parts per billion, or lower) of benzene, toluene, ethyl benzene, xylene, phthalates, Aldrin, furans, ethyl

parathion, and breakdown products of the carbon tetrachloride spiked into the SQI as part of a test procedure.

In the quench liquid, or brine left after incineration, low levels of tetrahydrofuran and other organic compounds (apparently organic acids and carbon- and nitrogen-containing breakdown products of incineration) were tentatively identified. Metals were identified in the quench liquid at levels approximately equivalent to their occurrence in Basin F liquid, with relatively high concentrations of potassium, sodium, and copper, and low levels of lead, calcium, and nickel. Other metals were present at very low levels or not detected. Anions reported included chloride, sulfate, phosphate, nitrate, and fluoride, at levels equivalent to those previously determined for Basin F liquid.

There are no analyses of the solid salt fraction, but since the salt is derived from the Basin F liquid, it is composed of major ions present in the liquid, with traces of other compounds from the liquid. Analyses of Basin F liquid are presented in the final Treatment Assessment Report. Please refer to this report for analyses of the liquid composition. Please also note that the insoluble salt residues will be addressed by the final Record of Decision or a subsequent IRA phase, if needed, as pointed out in the responses to Comments 4 and 5 above.

Comment 8: What are the health and environmental effects of the toxic components of the solid salt fraction, and any products created by its treatment method, including emissions?

Response: The health risk assessments conducted in both the initial assessment/decision phase and later, in the predesign phase, considered the toxic constituents in the solid portion of the Basin F liquids. Please refer particularly to the results in the draft Public Health Risk Assessment.

The draft Public Health Risk Assessment was performed according to U.S. EPA guidance and evaluated the noncarcinogenic and carcinogenic health risks for five receptor populations, including 1) on-site workers, 2) members of the public who live at the RMA fenceline, 3) the most highly impacted residential area, 4) the Irondale residential area, and 5) pupils at Hanson School.

The noncarcinogenic health risk is expressed in terms of a hazard index. The highest hazard index calculated was 0.00145 for on-site workers, and lower values were determined for all other populations. Whenever the hazard index is less than 1.0, there is no cause for concern.

Carcinogenic health risks are expressed as an individual's increased risk of contracting cancer. The maximum estimated excess cancer risk for off-site populations in this study was  $6.84 \text{ E-}08$ , or less than 7 excess cancers for each one hundred million people. The excess cancer risk for on-site workers was calculated to be  $4.55 \text{ E-}07$ , or less than 5 excess cancers for each ten million people. These carcinogenic health risks are within the range generally considered acceptable under U.S. EPA guidelines.

It is concluded from the draft Public Health Risk Assessment that emissions from submerged quench incineration of Basin F liquids at the Rocky Mountain Arsenal site will not pose

unacceptable cancer risks or noncarcinogenic health risks to the populations evaluated in this study.

Comment 9: How is the solid salt fraction to be separated from the liquid fraction such that there is no contamination of the solid salt fraction by remaining liquid or its residues?

Response: There will be no deliberate separation of the salt fraction. Please refer to the responses given for Comments 4 and 5 above.

Comment 10: If the solid salt fraction of the Basin F liquid is to be incinerated along with the liquid fraction, then how is it to be homogenized?

Response: This comment is nearly identical to Comment 5 above. Refer to response to Comment 5.

Comment 11: How will the piping system for transporting the Basin F liquid to the SQI, that is, the atomizer nozzle feed line system, be kept free of clogging and/or excessive corrosion?

Response: Optimization of the design of the feed line and nozzle will be addressed during the predesign test and in the design phase. Details of these issues will be included in the Draft Implementation Document. There are methods, e.g., steam injection, which may be incorporated to prevent nozzle clogging. Please refer to the response given for Comment 3 above.

Comment 12: What is the risk of a spill or leak of Basin F liquid from atomizer feed line system maintenance and/or repair operations?



Response: The Army will evaluate the probability of, and worker risks associated with, a spill or leak of Basin F liquid during handling prior to incineration. This evaluation will be performed in the Systems Safety Hazard Analysis of the final design of the SQI system.

The Army recognizes that it is unlikely that all potential spills or leaks can be prevented. For that reason, the Army will utilize secondary containment in the design of the liquid feed system in conformance with EPA guidance. Secondary containment may take the form of double-lined piping, berms, building configuration, and controlled ventilation. It is our belief that the greatest health risk from spills or leaks will be to plant workers. The Army contractor who operates the facility will be required to develop a health and safety program that addresses personal protection and safety procedures.

Comment 13: What is the risk of a leak or spill from the atomizer feed line system during normal operations?

Response: The probability of, and worker risks associated with, a leak or spill will be addressed in the Systems Safety Hazard Analysis as noted above. Please refer to the response given to Comment 12 above.

Comment 14: What is the risk of a spill or leak of Basin F liquid from ruptures or other breaches in the Basin F feed line system, both to the environment and inside the incinerator and its enclosing structure (surrounding building or other structure)?

Response: As described in the response given to Comment 12 above, secondary containment will be evaluated and designed for potential spills or leaks where appropriate. In terms of risk, please also refer to the response given to Comment 12 above.

Comment 15: What type of monitoring system to detect leaks and/or spills of the atomizer feed line system will be used?

Response: As previously stated, the Army will have sufficient controls and procedures in place to detect and contain potential leaks. The exact type of monitoring system will be determined and selected during the design process and will be described in the Draft Implementation Document.

Comment 16: Who will set and enforce Basin F liquid leak, spill, or other release monitoring standards? Will any amount of Basin F liquid be permitted to be released into the environment via any route? If so, how much? Why would such a release be permitted?

Response: This is discussed in Section 9.0 of the Draft Decision Document. Existing ARARs are already enforceable. For emissions of unregulated compounds, standards are developed and then become enforceable. Please refer to this section for details.

Comment 17: Will such monitoring for leaks, spills, etc., be continuous? If not, why not?

Response: As explained in the response given to Comment 15 above, the exact type of monitoring system will be determined during the design process. The Army anticipates that it could be a

combination of continuous and periodic monitoring, depending upon process conditions.

Comment 18: How will the atomizer nozzle feed line system be kept from clogging?

Response: This comment is nearly identical to Comment 11. Please refer to the response given to Comment 11.

Comment 19: Will there be any penalties for leaks, spills, or other releases? What would they be?

Response: CERCLA does not impose penalties on a response authority for leaks, spills, or releases resulting from actions taken as part of a CERCLA cleanup.

Generally, the real penalty for a spill or release would be the erosion of public confidence and the effort and cost of additional control or cleanup actions to manage the spilled hazardous material. It remains the paramount interest of the Organizations and State to manage the remedial activity properly the first time.

Comment 20: Would any public monies, e.g., Army funds, ever be used to pay for any fines or monetary penalties incurred at Rocky Mountain Arsenal, especially incurred over implementation, operation, and/or decommission of the Basin F liquid IRA?

Response: The Army has no funds that are not public monies. Please refer to the response given to Comment 19 above.

Comment 21: Do we correctly understand that the Army and Shell Oil Company pledge that if the SQI is built for this IRA, it

will be decommissioned and disassembled at the end of the Basin F liquid IRA, not to be used for any other purpose?

Response: The incinerator will be shut down and thoroughly cleaned following completion of treatment of basin F liquid and other process-generated waters from the Basin F IRA. Furthermore, the Army has committed that the incinerator would not be used for non-Arsenal wastes, that is, no wastes would be imported to RMA from other locations for incineration in this equipment. However, based on the outcome of the 1993 Record of Decision, some of the equipment may be suitable for processing other aqueous streams or liquid wastes that result from future remedial activities at the Arsenal. Any later utilization of the incinerator or its supporting air pollution equipment would only occur after following the same process used here, i.e., public participation in development of a formal decision, trial burn, and strictly following EPA and State guidance.

Comment 22: How long would such a decommissioning/disassembly take? What health and environmental effects might arise from such activities, such as toxic fumes being released from storage tank disassembly or incinerator disassembly, or the generation of contaminated dust clouds, etc.?

Response: The decommissioning of the SQI and auxiliary equipment would take a period of six months or less. The feasibility of steam cleaning the storage tanks and feeding the residues to the SQI will be evaluated in the design phase. Any residues in the storage tanks and incinerator are anticipated to be minimal and would be metal-laden salts. The disassembly of the tanks is not part of this IRA. It is not expected that unsafe levels of harmful vapors would be released during the decommissioning of the SQI treatment equipment.

Comment 23: What are the health risks to the environment, to the general Public, and to the workers at the SQI complex if Basin F liquid leaks, spills, or other releases due to ruptures or other breaches of the atomizer feed line system were to occur?

Response: This comment is similar to Comments 12, 13, and 14. In terms of risk and engineering controls to mitigate risk, please refer to the responses given for those comments. In terms of health effects, the public health risks associated with a spill of Basin F liquids were evaluated for the possible off-site transportation of Basin F liquids. These health risks were reported in the Treatment Assessment Report. It was assumed in the off-site transportation scenario that all the contents of a tanker truck (4,500 gallons), were spilled in a residential area and that the nearby residents were exposed for the entire seven days (no evacuation) that were assumed to be required for cleanup activities. The carcinogenic risk with the above scenario was less than one in a billion, compared to EPA's generally acceptable risk of one in a million. The hazard index based on the above spill scenario was 31, a value that shows cause for concern. The hazard index was due to the ammonia that may volatilize from Basin F liquids.

In order to view this noncarcinogenic health risk in perspective, the actual risk to the public would be much less than that associated with a spill of commercial anhydrous ammonia which is presently shipped by tanker truck. The hazard would be similar to (but less than) a similarly sized spill of household ammonia.

A spill of Basin F liquid at the incinerator site, while not expected, would likely be a very small volume of liquid (compared to the tanker truck scenario). The on-site workers would experience health risks similar to those described above if they wore no protective equipment. Off-site public risks associated with an on-site spill would be much less than those risks described above for the off-site tanker truck spill scenario, because dispersion of any airborne chemicals occurs prior to reaching Public locations.

Comment 24: What is the composition of the spray dryer residue? What are the environmental and human health effects of the residue?

Response: A spray drying process produces a salt or filter cake that has a certain percentage moisture. The salt or filter cake will contain all the nonvolatile salts or nonvolatile metals. The hazards associated with this product would be minimal and comparable to those of other wet salt as described in Section 4.3 of the Treatment Assessment Report.

Comment 25: What emissions will come from the bag house attached to the spray dryer operation? What sized particles will be emitted from the bag house?

Response: Emissions from any spray drying process will be filtered in a mechanical system (such as a baghouse or cyclone). The emission from the filter system would consist of small quantities of relatively innocuous (sub-micron sized) salt particulates. The gas scrubbing technology used will be designed to ensure that any such emissions will remain within regulatory limits.

Comment 26: Has a SQI of this size ever been built before? If so, has it burned substances akin to Basin F liquid? Is there any information available on its (or their) safety and performance record? If not, how reliable are tests and projections made using smaller scale SQIs, given the unique nature of Basin F liquid? Is the public going to be used as the proverbial "guinea pig" while design flaws and modifications are made?

Response: One hundred sixteen SQI plants of comparable and larger size have been built and are in operation. Those SQI facilities contacted have reported excellent safety and performance records.

There are eleven T-Thermal Sub-X SQI units in the U.S. and Puerto Rico which have operational experience with liquids similar to Basin F liquids that is, liquid containing percentage levels of salts plus pesticides or other chlorinated and sulfonated organics. These facilities have continuous operating histories ranging from several years to over ten years. Most of these industrial applications are larger (higher throughput) equipment than the Basin F system and were scaled up from tests on smaller-scale units, such as the unit Basin F liquids were tested on. They all have good operating history and performance reliability.

Start-up procedures described in the Implementation Document will assure that incinerator operations will minimize impacts on human health and the environment and attain regulatory standards. The Army has committed to the public that the incinerator will be operated safely at all times.

## Woodward-Clyde Consultants

Comment 27: Is there a time constraint on the Army and Shell to get this IRA under way? If so, couldn't this lead to rushed and inadequate consideration of the various risks involved in this proposed IRA?

Response: The Army is operating under a five-year interim storage agreement per the Federal Facility Agreement based on the service life of the tanks. The activities related to this IRA have not been rushed, e.g., the selection and testing of treatment technologies and selection of a preferred alternative took place over a 10-year period. It is the Army's objective to not "rush" this project. We believe this project can be accomplished correctly using SQI within the five-year service life of the storage tanks. If we cannot do this, we will pursue additional storage options.

Comment 28: Will the SQI be operated by computer control; that is, will a computerized system control liquid feed, oxygen enrichment, gas flow, atomization nozzle steam clearing of molten salt build up, etc.?

Response: Probably yes. The exact design of the control system will be evaluated during the final design phase. Whatever control system is used will have a backup system in addition to operator oversight.

Comment 29: If so, has the computer program been developed? If it has been, or is going to be, we request a copy of the test protocol devised for testing this computer program to make absolutely sure it has no bugs. Will testing be trial and error at community risk, or some thorough off-line testing of all possible conditions? We request the protocol copy, and the Army, Shell Oil, and EPA evaluation of the protocol.



Response: No computer program has yet been developed. If computer control is selected, the manufacturer of the computer control equipment will provide the program and will be required, prior to startup, to test it by inputting artificial input data to simulate all operating conditions including trips and shutdown modes. Such offline testing will not put the community at risk. Please refer to the response given to Comment 28 above.

The program logic will be presented in the Draft Implementation Document and will undergo EPA, State, and Shell review. Their review of the program logic will be available for public examination in their comments which will be published in early 1991 in the white cover (final) version of the Implementation Plan. Details of the control program will not be presented in the Final Implementation Document.

Comment 30: Without knowing the exact composition of all of the wastes, how can a computer program to run the SQI be tested at all with any assurance of protecting public and environmental health and safety?

Response: The emissions of potentially harmful chemicals from the treated stack emissions from the SQI are directly related to easily monitored emissions, such as carbon monoxide and total particulates. The public health risk assessment determined health risks at specific design operating conditions which include particulate and carbon monoxide emissions. If these easily monitored emissions were to increase during operation to unacceptable levels (the potentially harmful emissions would also increase

proportionally), the SQI operation would either be modified or shut down by the computer control.

Comment 31: The Scott Environmental Technologies section of the T-Thermal test report, pages 25, 49, and 50, note that certain samples sent for analysis to the Rocky Mountain Analytical Laboratory (RMAL) (also referred to as Enseco in the report) were inappropriately extracted, rendering any accurate analyses impossible, in particular analyses for PCDD/PCDF, or dioxins and furans. Hence, any conclusion that there will be no dioxins emitted from the SQI based on this test report cannot be justified, although just such a statement was made by a Woodward-Clyde representative at the January 11, 1990, public meeting over this proposed SQI IRA. At present, no one knows if dioxins will be emitted from the SQI, or in what amounts. A second analysis of the sample with proper extraction (using toluene rather than methylene chloride) should take place, even if that means a second test incineration should be conducted to obtain the sample.

Response: The primary function of the T-Thermal treatment evaluation test conducted on February 21 through 23, 1989 in Conshohocken, Pennsylvania was to evaluate the treatability aspects of Basin F liquid. We agree that a subsequent analytical testing program which includes the analyses of dioxins and furans needs to be evaluated and conducted as necessary during the predesign testing.

Comment 32: On pages 25 and 26 of the test report section mentioned immediately above, it is stated that all results of the RMAL analyses are questionable since many of the spike compounds (compounds intentionally added for calibration purposes)

could not be detected. With other spiked compounds, too high results were found. Failure to analyze a spiked field blank eliminated the possibility of determining field contamination, and therefore quality assurance of the handling of samples and test methods. One of the sample vials was spiked, but analysis was unable to detect any of the spiked compound. These and other problems mentioned on these pages throw into question any results of "semivolatile", organochlorine, or organophosphate analyses.

How can we or anyone rely on the results of tests based on these samples, or the PCDD/PCDF samples mentioned above, as valid?

Response: This comment is similar to Comment 31 above. Please refer to the response provided above. Subsequent analytical testing for dioxins and furans will be addressed during predesign testing.

Comment 33: On page 26, the same as mentioned immediately above, it is stated that metals testing was not conducted for the stack emissions, but only for within-incinerator operations.

What metals, and what quantities of these metals, will come out of the stack emission?

Response: The draft Public Health Risk Assessment demonstrated that if arsenic were present in stack emissions, arsenic would be a major contributor to carcinogenic risk. During the Shell T-Thermal treatability test burn, stack emissions were sampled for arsenic but none was detected. Additional measurement and sampling will be done during the upcoming

predesign testing to further examine the fate of arsenic and other metals. This information will be available in the Implementation Document.

Comment 34: What are the environmental and human health effects of these metals?

Response: The environmental and human health effects from metals emissions will be identified in the standard setting procedures for air emissions as outlined in Section 9.0 of the Decision Document.

Comment 35: The Scott Environmental Technologies section of the test report, page E 2, shows a power failure during the second run. Generally during such test runs as this, every measure is taken to assure reliable performance of the test equipment; even under such circumstances one run was scrubbed. At the public meeting on January 11, 1990, we were told such shutdowns are very rare. How rare are they? What is the factual basis for such a claim?

Response: The treatment evaluation tests referred to in this comment were conducted on pilot-scale equipment at T-Thermal's testing facility. This testing was not designed to serve as a formal EPA-type trial burn. It should be pointed out that the power failure affected the sampling effort not the incinerator performance and that there were no increased risks to human health or the environment as a result of this sampling train power outage. The RMA SQI will have safeguards built in to ensure minimal chances of power outage during sampling activities and waste feed cutoffs to ensure that the system would shutdown.

Comment 36: Participants at the January 11, 1990, public meeting were told that 116 of these SQIs are in use worldwide, and that a questionnaire was sent to 11 such facilities in the U.S.A. asking about performance and safety issues. 7 were returned. (As of Jan. 23, 1990, this report was not available to the public - the comment period ended Jan. 30). Is a study with data on only 7 such incinerators an adequate data base to get a realistic understanding of the safety and performance records of SQIs?

Response: As described in the Decision Document, Basin F liquid is unique in physical and chemical characteristics. Eleven SQI facilities were identified as treating waste similar to Basin F liquid and the seven responding facilities indicated excellent safety and performance records. This information is used to establish background history only. The RMA SQI will be evaluated by the EPA guidelines for hazardous waste incinerators. These guidelines include safety and performance based criteria to insure safe and consistent operation in compliance with all regulations. A response from the remaining four facilities has been obtained and a complete report will be provided in March 1990. Note that a summary of the operating record of the 11 T-Thermal units in the U.S. and Puerto Rico is included in the response to Comment 26.

Comment 37: A representative for Woodward-Clyde Consultants said at the January 11, 1990, public meeting on this IRA proposal said that their "Risk Evaluation Report for the T-Thermal Test Burn" was based on the T-Thermal test report. Is this so? If so, any conclusions from that Woodward-Clyde report are highly questionable, and should be considered invalid. (It was the same representative of Woodward-Clyde who said there

were no dioxin emissions from the test burn). (This "Risk Evaluation" was not available to the public as of Jan. 23, 1990).

Response: The risk evaluation report, which is titled the draft Public Health Risk Assessment, was based on the monitoring data collected during the T-Thermal SQI testing, except where the data were questionable. In those instances, conservative data were used to estimate the maximum possible health risk. The risk assessment did not show a change in public risk over that estimated by using process efficiencies and hence did not affect the selection of SQI. The purpose of the risk assessment, based on the monitoring data already collected, was to identify risk elements and thereby begin the design process in terms of setting design goals for further reducing public risk. The risk assessment results will be factored into the design of the actual SQI unit so that public safety can be assured.

The Army has committed to an open design process. As part of that open design process, the Army released the risk assessment as it became available. It was not part of the Decision Document, even though it was issued during the comment period. Both Shell and the Colorado Department of Health already have provided comments on the risk assessment to the Army. National Toxic Campaign is also welcome to provide comments on the risk assessment to the Army. Comments received will be considered during the design process. The Army will continue to release documents to the public as they become available because it provides the most "timely" access possible.

## Woodward-Clyde Consultants

Comment 38: In the RMAL Enseco report included in the Scott Environmental Technologies section of the test report, there are 9 "unknown" compounds listed in the HSL Volatile Organics "tentatively identified compounds" reports (unpaginated), and 15 compounds only tentatively identified.

Response: The science of analytical chemistry is not perfect. Tentatively Identified Compounds (TICs) are compounds in samples that are not the target compounds, internal standards, or surrogate standards. A reasonable approach is to subject the nontarget compounds (those greater than 10 percent of peak areas or heights of the nearest internal standard) to mass spectral library searches for tentative identification. Unknown TIC compounds are those that do not match any spectral library compound with any degree of confidence to allow a tentative identification.

Comment 39: Will the Army and Shell Oil and/or the EPA make the effort necessary to identify the "unknown" and "tentatively identified" compounds? If not, why not?

Response: Identification of the "TIC" compounds will be emphasized during the full-scale trial burn, prior to any full-scale operational treatment of Basin F liquid on site. The Army wishes to emphasize here that some "TICs" are true unknowns. That is, they do not match any of the existing spectral or other characteristic information for known chemicals. In other words, even though the Army utilized the most advanced state-of-the-art analytical methods, the compounds extracted and isolated by these methods cannot be identified.

## Woodward-Clyde Consultants

Comment 40: Will the Army or Shell Oil and/or the EPA do the testing necessary to determine the human and environmental health effects of these "unknown" and "tentatively identified" compounds before exposing the public and surrounding environment? If so, what methods will be used to do this? If not, why not? At the January 11, 1990 public meeting we were told all precautions would be taken to protect the public.

Response: The Army will perform a full-scale trial burn before full-time operation of the incinerator begins. The trial burn will incorporate extensive monitoring of the feed and emissions compounds. A risk assessment based on measured emissions from the trial burn will be used in a standards setting process to establish performance goals. As described in the response to Comment 39 above, some compounds are true "unknowns" which cannot be identified even by the most state-of-the-art analytical methods. Hence it is not possible to determine any risk associated with these unknown compounds. The main focus of the risk assessment must reasonably be on those compounds which are more easily identified and present the highest known risk.

Comment 41: How will the public and the environment be protected from exposure to novel and exotic compounds for which no standards of exposure have been developed? Will the EPA do the testing and research necessary to develop these standards? Will there be any controls to limit exposure to all of these currently unregulated compounds? If not, why not? If so, again, will the Army and Shell Oil wait until the exposure and emission standards are set before starting incineration? If not, why?



Response: The Army will design the Basin F liquid treatment facility to achieve emission levels for regulated compounds. The same pollution abatement equipment will also by its inherent design limit the emission of unknown or tentatively identified compounds. The Army has also committed to an EPA standard-setting process for total emissions with a goal of no increased cancer risk greater than one in a million. In this process, conservative assumptions will be used when compound identification is in doubt.

The Army would like to point out that a substantial proportion of the risk identified in the draft Public Health Risk Assessment is based on inorganic compounds (such as arsenic and cadmium, for example) which are more easily identified in the Basin F liquid or in the stack emissions from the SQI. The U.S. EPA's risk assessment approach is to focus on the most toxic and environmentally mobile compounds that are identified at a site. Thus, focusing on designing the SQI to minimize emissions of these known compounds is of far greater benefit to the public than attempting to identify every unknown compound that is observed at the technical limit of instrument detection capability.

For example, cadmium was detected in the SQI stack emissions and accounts for up to 55 percent of the total potential cancer risk calculated for an adult living at the RMA fenceline. This calculation took into account only chemicals actually detected in the stack emissions. Arsenic is present in Basin F liquid but was not detected in stack emissions. If it is assumed that arsenic is present at the detection limit in the SQI stack gases, then arsenic and cadmium together would account for nearly 70 percent of the potential cancer risk calculated from this expanded suite of

## Woodward-Clyde Consultants

chemicals. Details of these calculations are given in the draft Public Health Risk Assessment.

Any further EPA testing, research, and regulation development would be a national EPA effort and decision and not under the purview of the Army. Please refer to the response given to Comment 42 below.

Comment 42: If, after extended operation, the SQI began to create and emit novel unknown or only tentatively identifiable compounds, will the Army and Shell Oil shut down operations of the SQI until adequate testing and exposure and emissions standards are developed for the newly appearing compound(s)? If not, why not?

Response: The incinerator will undergo extensive emissions and product monitoring during a full-scale trial burn prior to operation. Operating limits, performance goals, and shutdown requirements will be established at that time with the intent of limiting emissions to levels consistent with health risk-based levels for organic PICs and inorganic emissions. These operating limits and goals and shutdown requirements will remain in force for the duration of the remediation with no changes anticipated at this time.

Comment 43: Will there be only 1 stack on the SQI, or more? If more than 1, what different types of emissions will come from each, and have they been characterized yet? What are the environmental and health effects of such emissions?

Response: It is anticipated that the SQI and spray dryer will share some common pollution abatement equipment and will have only one stack.

Comment 44: Will there be a "dump stack" on the SQI, that is, an emergency stack to use in case the main stack and its pollution control devices (or a pollution control subsystem) fail? If yes, will such a dump stack be equipped with pollution control devices which would provide similar levels of protection to the public as the main stack? What types of pollution control devices would be installed on such a dump stack? Who would monitor emissions? Who would be notified of the failure of the main stack and/or its pollution control system?

Response: It is not planned at this time to include a "dump stack" on the SQI. If some part of the air pollution control system were not to operate properly, the system response would be to shut the SQI down.

Comment 45: An Enseco/RMAL letter dated March 14, 1989 from Gary Walters to Scott Beals questions the validity of OCP tests, in the Scott Environmental Technologies section of the test report. This is another indication of the questionable validity of the test results.

Response: The Army questions National Toxic Campaign's interpretation of the March 14, 1989 letter from Gary Walters of Enseco-Rocky Mountain Analytical Laboratory to Scott Beals of Morrison-Knudsen Engineers, Inc. In this letter, Gary Walters of Enseco-RMAL noted that several other types of compounds analyzed for with the same detection device used in the OCP test for Organo-chlorine Pesticide/PCBs were detected. Thus, he said, the same detector should respond appropriately to OCP compounds if present, even though the surrogate recoveries for dibutylchloroendate (DBC, a compound

spiked into the OCP samples) were somewhat low. Gary Walters concluded, "Considering my knowledge of these samples and recoveries from similar samples, I do not feel the DBC surrogate recoveries are out of line." In summary, the letter affirmed the validity of the OCP analysis.

Air emissions will be analyzed during the full-scale trial burn to address any discrepancies in previous data. Moreover, analyses specific to metals emissions and dioxins and furans emissions will be performed during the predesign test program.

Comment 46: Is the quenching liquid to be water only, or might some other material or materials be used or added to the water? If so, what are the other materials? What effect might they have on waste water or quench brine composition?

Response: The quench water will include "make up" water (or, water added to make up for evaporation and other losses within the process) and "blowdown" (water used to clean, or blow down, the air pollution control equipment) from the air scrubber. Dilute sodium hydroxide will be added to the final air scrubber to help neutralize or destroy acid gases before they leave the stack. The blowdown from this scrubber will contain dilute product salts and will be recycled in its entirety as quench water. This stream will have no harmful incinerator product. All incinerator product waters, including the scrubber water, will be evaporated in a spray dryer. There will be no other wastewater streams of any type.

Comment 47: What is the risk of the SQI or any of its components exploding? On what basis is your answer founded?

Response: The Basin F liquid is neither explosive nor flammable as would be expected of a concentrated salt water solution. It is, in fact, incapable of sustaining a flame without auxiliary fuel. Other SQIs operating on natural gas fuel, as is the proposed design, have no history of explosion in any application anywhere. These issues will be addressed specifically in the System Safety Hazard Analysis which will be performed on the final design of the SQI.

Comment 48: Will the incinerator operate at 1800 degrees F, as stated several times during the January 11, 1990, public meeting? Or 1900 degrees F? The test report on page 22 of the first section, states that operation at 1800 vs. 1900 degrees F produced unacceptably high CO (carbon monoxide) emissions.

Response: The incinerator will operate at whatever minimum temperature is required to ensure destruction of organic species as indicated by emissions measurements. The correct temperature range will be determined during the full-scale trial burn but will likely be above a minimum of 1800° F.

Comment 49: Will there be an actual test evacuation exercise at a worst case time, say, 2:00 a.m. on a Saturday morning? If not, why?

Response: The Army's requirements for plant workers training will include test drills of emergency situations including emergency shutdown and evacuation of plant and other arsenal site workers. However, the Army's area of authority is limited to the area within the boundaries of RMA. Off-post, the Army will notify appropriate local authorities and cooperate fully with their decisions on appropriate

actions. The local authorities are responsible for community emergency response actions and determining if "drills" are warranted. The Army will not impose on neighboring citizens the requirements of an evacuation drill. Emergency plans will be developed for On- and Off-post in cooperation with local authorities.

Comment 50: On page 9.7 of the Basin F liquid IRA Proposed Decision Document, there is the following sentence: "If necessary to depart from the CERCLA accepted risk range, the Army will issue an amended Decision Document for review and comment consistent with the procedures contained in paragraphs 22.9 to 22.16 of the Federal Facilities Agreement."

Does this mean the Army or Shell Oil could try to change the exposure or emissions standards of any compounds from the SQI "if necessary"? What would constitute a "necessary" reason for such a departure?

At the January 11, 1990, public meeting, you (specifically Mr. Campbell) said you would stay within permitted levels for contaminants - or try to do better. Why then the need for a process to exceed or change these standards, or "risk range"?

Response: The Army, as the Lead Agency, is responsible for the issuance of Decision Documents. As reflected in the Draft Final Decision Document, if, after the trial burn, a significant departure from the stated risk goal is necessary, the Army will issue an Amended Decision Document for public comment. The Army believes it is highly unlikely that the design goal cannot be achieved.

## Woodward-Clyde Consultants

Comment 51: The National Toxics Campaign hereby requests the right to obtain samples for monitoring the performance of the SQI at the Rocky Mountain Arsenal, and to be included, if we wish, to receive any split samples for monitoring, for independent monitoring at our own lab.

Response: Performance monitoring or analyses of split samples will be provided by independent oversight by the EPA, and the State of Colorado or their agents, as they so choose. The Army does not believe that additional split samples with NTC or other organizations are justified or appropriate. Additionally, CERCLA and the FFA have no provisions for citizen samples from remedial processes.

Comment 52: The National Toxics Campaign hereby requests a one liter sample of Basin F liquid, collected under EPA procedures, so we can conduct our own analysis of the liquid.

Response: CERCLA and the FFA have no provisions for issuance of hazardous waste samples to private or citizen groups. The Army is not willing to accept responsibility or liability for National Toxic Campaign's handling of any Basin F liquid. For example, the Army is also aware that previous sampling results, reported after a test sponsored by National Toxics Campaign of drinking water in the local area, proved to be significantly flawed.

APPENDIX A.7  
LEAGUE OF WOMEN VOTERS - COMMENTS AND RESPONSE

---

A.7-1



THE LEAGUE  
OF WOMEN VOTERS  
OF COLORADO

January 29, 1990

Recd  
1600  
29 Jan 90  
skp



To: Program Manager for Rocky Mountain Arsenal  
Building 111  
Attention: Donald L. Campbell  
Commerce City, CO 80022-2180

COMMENTS ON THE PROPOSED DECISION DOCUMENT FOR THE  
INTERIM RESPONSE ACTION:  
BASIN F LIQUID DISPOSAL, ROCKY MOUNTAIN ARSENAL

The League of Women Voters, a nonpartisan political organization, encourages the informed and active participation of citizens in government and influences public policy through education and advocacy.

The League of Women Voters promotes an open governmental system that assures opportunities for citizen participation in government decision making. Therefore we have the following comments about the citizen participation portions of the proposed decision document:

1. Opportunities for citizen participation have been extensive and open. The forums, written materials and workshop all helped citizens understand the process. However, the meetings could have been structured in a manner which would have been more helpful for citizens who wished to speak. The usual format was to ask for questions from the audience beginning with private citizens, then organizational representatives, then public agencies. Citizens would have been better served if they had been allowed to hear the comments of organizations and public agencies before they were asked to comment. They would have a better understanding of the issues and they would have had more time to gather their thoughts and get up their nerve. The small number of people who actually spoke at the well attended hearing on January 11 could be the result of the structure of the hearing.

2. We fear that the role of citizens in the response to Basin F liquids will now be limited to a question/answer format using the hot line, rather than allowing opportunities for citizens to participate in the decisions. We request that the Community Relations program of the IRA include additional hearings and/or the creation of a Citizens' Advisory Committee. The Citizens' Advisory Committee could be funded to hold open meetings and to be used as an avenue for citizen participation in the decision making process. It has been noted that the Technical Review Committee holds closed meetings and therefore would not meet our request for open meetings.

3. When developing the Health and Safety Plan, we support your proposal to take into consideration known hazards as well as potential risks. We encourage the use of citizens (see 2 and 3 above) in developing both the Health and Safety Plan and the Emergency Response Plan.

4. In addition to (or in stead of) a Citizens' Advisory Committee we also request that a citizen Ombudsman position be created to participate in the decision making process as an advocate of the citizens as well as to act as an interpreter between the public, the cleanup efforts and the governmental agencies involved. The role of the Ombudsman would be to act as an advocate for the public interest. This function is not to be confused with the role of the Public Affairs and Communications offices who act on behalf of the Army or the EPA.

5. The League of Women Voters supports recycling where feasible. We, therefore, request that every effort be made to recycle at least some of the metals in the brine waste after incineration. Recycling would reduce the amount of waste to be disposed and might help reduce the cost of incineration.

6. We are concerned about the protection of human health and the environment and request that standards for stack emissions, data resulting from the continuous monitoring program, and ambient air monitoring be made readily available to the public, including organizations, citizens, and the media. At the least, this information should be available at the Joint Administrative Record and Document Facility and the libraries used for public information. There might be justification for a computer generated/modem retrieval system in which the data could be made available by telephone to those having access to a modem. The usefulness of such a system would depend on the choice of data made available and the cost, if any, to the users.

7. We object to the fact that the Draft Public Health Risk Assessment Report on the Submerged Quench Incinerator was not printed until after the public hearing on the Incinerator. We object to the fact that comments on the Incinerator must be submitted no later than January 29 when the Health Risk Assessment Report was printed on January 22. We reserve the right to further comment and possible changes in our comments after we have had time to analyze the Health Risk Assessment Report.

The final decision on Basin F Liquids still has many unanswered questions, as is appropriate at this stage. We cannot support any decision making process which does not include citizen input, even in the face of the deadlines you have set for the cleanup of the Arsenal. It took almost 40 years to create the problems you are now addressing. We urge you to take enough time in the planning stages to allow for cleanup processes which will, indeed, protect human health and the environment.

*Patricia L. Johnson*

Pat Johnson, President

*Sharon Clark*

Sharon Clark  
Natural Resources Coordinator

**RESPONSE TO COMMENTS OF LEAGUE OF WOMEN VOTERS OF COLORADO  
ON PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID DISPOSAL**

Comment 1: Opportunities for citizen participation have been extensive and open. The forums, written materials and workshop all helped citizens understand the process. However, the meetings could have been structured in a manner which would have been more helpful for citizens who wished to speak. The usual format was to ask for questions from the audience beginning with private citizens, then organizational representatives, then public agencies. Citizens would have been better served if they had been allowed to hear the comments of organizations and public agencies before they were asked to comment. They would have a better understanding of the issues and they would have had more time to gather their thoughts and get up their nerve. The small number of people who actually spoke at the well attended hearing on January 11 could be the result of the structure of the hearing.

Response: The Army chose this meeting structure to allow private citizens the opportunity to express their unbiased concerns or ask for information before other parties spoke. Future meetings may be structured in other ways if the community so desires. The Army encourages citizens to speak whenever they wish, including during the organizations' time or afterward.

## Woodward-Clyde Consultants

Comment 2: We fear that the role of citizens in the response to Basin F liquids will now be limited to a question/answer format using the hot line, rather than allowing opportunities for citizens to participate in the decisions. We request that the Community Relations program of the IRA include additional hearings and/or the creation of a Citizens' Advisory Committee. The Citizen's Advisory Committee could be funded to hold open meetings and to be used as an avenue for citizen participation in the decision making process. It has been noted that the Technical Review Committee holds closed meetings and therefore would not meet our request for open meetings.

Response: CERCLA guidance calls for a Technical Review Committee (TRC). This committee has been formed and is structured to include representatives of the local community, so that citizen concerns are directed to the Army and vice versa. Additionally, the Army has committed to an open design, construction, and operation of this IRA. This will be accomplished through periodic additional meetings with interested citizens. The Army does not see the need for the formation of an additional committee. The presentation of information is the role of the TRC. While TRC briefings are closed meetings, the information presented is not proprietary and may be fully transmitted by attendees to their own organizations. The TRC already includes citizen members.

Additionally, Citizens Against Contamination (CAC) a local citizens group, has recently received a \$50,000 Technical Assistance Grant (TAG) from EPA to be used in conjunction with this IRA.

## Woodward-Clyde Consultants

Comment 3: When developing the Health and Safety Plan, we support your proposal to take into consideration known hazards as well as potential risks. We encourage the use of citizens (see 2 and 3 above) in developing both the Health and Safety Plan and the Emergency Response Plan.

Response: Pursuant to CERCLA, such plans will be available at the Joint Administrative Record and Document Facility (JARDF) at RMA for review by the community. The Health and Safety Plan to be developed will address activities of RMA and on-site personnel, but will consider comments made by interested citizens. The Emergency Response Plan details the Army's responsibilities for emergency activities in the surrounding community, which involve the notification of proper local authorities. The responsibility for citizen emergency action planning remains with the local authorities.

Comment 4: In addition to (or instead of) a Citizen's Advisory Committee we also request that a citizen Ombudsman position be created to participate in the decision making process as an advocate of the citizens as well as to act as an interpreter between the public, the cleanup efforts and the governmental agencies involved. The role of the Ombudsman would be to act as an advocate for the public interest. This function is not to be confused with the role of the Public Affairs and Communications offices who act on behalf of the Army or the EPA.

Response: Please refer to the response given to Comment 2. Under the National Contingency Plan, citizen input is one of several factors to be weighed in the decision-making process. The proper means of making such input is through the citizen TRC representative participation in meetings and by correspon-

dence. The Army does not believe that a citizen Ombudsman's position is required in addition to the Technical Review Committee. Consistent with the aim of providing input from an advocate for the public interest, EPA has special grant monies to be awarded to a selected citizen group (or groups). EPA is the sole decision maker in selection of citizen groups and award of funding and has exercised that responsibility for the RMA.

Comment 5: The League of Women Voters supports recycling where feasible. We, therefore, request that every effort be made to recycle at least some of the metals in the brine waste after incineration. Recycling would reduce the amount of waste to be disposed and might help reduce the cost of incineration.

Response: The Army will evaluate recycling/recovery of metals in the brine generated by incineration during the design phase. The brine will be spray dried on-site and the resulting salt disposed in an off-site hazardous waste landfill. The benefit to be gained from metals recovery and recycling must be weighed here against the primary mission, the safe and expeditious treatment of the Basin F liquid.

Comment 6: We are concerned about the protection of human health and the environment and request that standards for stack emissions, data resulting from the continuous monitoring program, and ambient air monitoring be made readily available to the public, including organizations, citizens, and the media. At the least, this information should be available at the Joint Administrative Record and Document Facility and the libraries used for public information. There might be justification for a computer generated/modem

retrieval system in which the data could be made available by telephone to those having access to a modem. The usefulness of such a system would depend on the choice of data made available and the cost, if any, to the users.

Response: The emissions standards and health-based performance goals will be determined as a result of the full-scale trial burn prior to the start of full-scale treatment operations. The resulting information will be available in a timely manner in the JARDF in printed form. There are no current plans for performance data to be available through a computer network. The Army will continue to evaluate the best form of public interaction, but does not now see a demand for this which would justify the additional cost.

Additionally, Citizens Against Contamination (CAC), a local citizens group, has recently received a \$50,000 Technical Assistance Grant (TAG) from EPA to be used in conjunction with this IRA.

Comment 7: We object to the fact that the Draft Public Health Risk Assessment report on the Submerged Quench Incinerator was not printed until after the public hearing on the Incinerator. We object to the fact that comments on the Incinerator must be submitted no later than January 29 when the Health Risk Assessment Report was printed on January 22. We reserve the right to further comment and possible changes in our comments after we have had time to analyze the Health Risk Assessment Report.

Response: The Army has committed to an open design process. As part of that open design process, the Army released the risk assessment as it became available. It was not part of the Proposed Decision Document, even though it was issued during the comment period for the Proposed Decision Document. Both Shell and the Colorado Department of Health already have provided comments on the risk assessment to the Army. The League of Women Voters of Colorado is also welcome to provide comments on the risk assessment to the Army. Comments received will be considered during the design process. The Army will continue to release documents to the public as they become available because it provides the most "timely" access possible.

The risk evaluation report, which is titled the Draft Public Health Risk Assessment, was based on the monitoring data collected during the T-Thermal SQI testing, except where the data were questionable. In those instances, conservative data were used to estimate the maximum possible health risk. The risk assessment did not show a change in public risk over that estimated by using process efficiencies and hence did not affect the selection of SQI. The purpose of the risk assessment, based on the monitoring data already collected, was to identify risk elements and thereby begin the design process in terms of setting design goals for further reducing public risk. The risk assessment results will be factored into the design of the actual SQI unit so that public safety can be assured.



APPENDIX A.8  
CLARA LOU HUMPHREY - COMMENTS AND RESPONSE

---

A.8-1

COMMENTS ON THE PROPOSED DECISION DOCUMENT  
INTERIM RESPONSE ACTION  
BASIN F LIQUID DISPOSAL  
ROCKY MOUNTAIN ARSENAL  
DECEMBER, 1989.

by

Clara Lou Humphrey  
9390 West 1st Ave.  
Lakewood, CO 80226  
January 29, 1990.

Before getting into comments, I want to congratulate the Army on its efforts at community awareness and its willingness to listen to the concerns of the community in the past couple years. I understand that their main job is to remediate problems created by other people under other circumstances and that citizen involvement is a new role for most of them. In any community there are bound to be people who have suggestions which could, if needed, make the job more efficient, effective or socially accepted. By listening to community concerns and suggestions, the Army is availing itself of "free information" which I hope it puts to good use. I totally agree with the statement by EPA in their handout on Public Involvement in the Superfund Program: "Community relations activities give citizens a voice in decisions about actions that may affect them...Public involvement in Superfund contributes to sound decisions and greater protection of public health and the environment."

1. According to the objectives of this IRA for Basin F liquid disposal, this action is to "select the FINAL TREATMENT PROCESS for Basin F liquid currently stored in tanks and Pond A. If this is expected to be a final action, why is it being hurried through the process ahead of so many interim actions? Why is it being called an interim action? Why can't it wait until some of the real interim actions have been completed since at least 2 of them were presented as possible pilots for cleanup of Basin F wastes? It would not be appropriate to answer that this response is urgent because the last one which was tried did not work! As I understand it, the word of the "experts" was wrong on the amount of liquid in Basin F, the useful life of the tanks and the effectiveness of the pond as a holding facility until an appropriate final solution can be found. To use the excuse that these decisions proved wrong does not make a valid case for construction of an incinerator which will be vented into the already contaminated air of the Denver area, especially this early in the cleanup process. Please include in your written response proof that the damage being caused by the failure of the existing IRA is a great enough threat to health and the environment to justify building an incinerator (a final solution) before the other IRA's with their pilot potentials have been completed and the data analyzed.

2. I request that public input be accepted and responded to AT LEAST before the following have been finalized:

Pilot scale/testing

Selection of engineering design package.

I would further suggest PUBLIC MEETINGS when construction is beginning. HEARINGS after 6 months of operation, after 12 months of operation and before final plans for closure are made.

3. Since on-site incineration has been selected as the technology of choice, special care must be taken to assure protection of health and the environment. People of the Denver area have had a series of waste-disposal processes fail to perform as promised and be shut down soon after becoming operational.

4. The major assumption which led to the decision to choose an on-site solution seems to be that public trust in technological solutions to technological problems is virtually non-existent and that off-site facilities could not be permitted because of public pressure. Due to the failure of so many technological solutions, I must accept this assumption, but it makes it even more important to take your time, conduct pilot projects, further evaluate alternatives and do everything right the first time. Every failed solution in this country has added to your burden of gaining public trust. I suggest that you and your contractors owe it to others faced with superfund cleanup to place caution at the top of your schedule and consider the concerns of the public to be an asset rather than a hindrance to the performance of your task.

5. The appeal of incineration is that it greatly reduces the volume of hazardous waste to be disposed of. Unfortunately, incineration, as you propose it, would result in the releasing of some of that waste into the air. I request that the public and EPA be given the relative costs of your proposed system and one which would allow no emissions into the air. Although cost must be a factor, I submit that it has been given a higher rank in the decision process than is proper when the waste to be treated has the potential to cause harm to humans, wildlife, and the environment over such a long period of time.

6. Since the choice of a submerged quench incinerator was based on reports that there are some in operation and that they are able to process the Basin F liquids, a list of those currently in operation and the wastes being treated should have been part of the decision document so that citizens who need reassurance could easily have learned of their "track records". The need of the public is to be reassured. Reassurance does not come from schematic diagrams, it comes from the experience of others in similar circumstances.

7. The selection of the site, should you decide to go ahead with an incinerator at this time, must consider potential health risks not only to residents of neighborhoods that are adjacent to the Arsenal, but to all people. The effect of the incinerator on Denver's air, on acid rain, on farms and ranches in Colorado and adjacent states, and on the wildlife on the Arsenal must all be considered.

8. On page 6-1 the statement is made that "a pilot test has already been conducted using a Submerged Quench Incinerator to destroy Basin F liquid, at a scale of operation that minimizes the need for a subsequent pilot test to develop scale-up design data. The IRA could proceed directly to scale-up and the design process." It would be inappropriate to rely on data gathered at this stage for the pilot test. Another set of tests must be done as part of this action, preferably by another party, in light of the change in the purpose for the tests. The tests for

feasibility can be used for baseline data against which the pilot tests can be compared. Since time has passed since the first tests, it is important to have the liquids to be tested drawn from all three containers and the pond as well as from a variety of depths in each. It should cost less to properly test than to have to close down the plant because of a surprise!

9. Since at least one alternative to incineration has been suggested by the Colorado Department of Health. (Super Critical Water Oxydation) and since you are proposing a final, and not an interim action, you should consider this alternative as well as others which may be "on the shelf" within the next few years. Basin F liquids have been contained temporarily to buy time to find the best possible solution. Take advantage of that opportunity.

10. According to the "Proposed Decision Document for the IRA", several important mistakes were made by Woodward-Clyde Consultants and corrected in the process of developing this document. Perhaps another consultant should be used for future work, one which is familiar with the guidelines and which has had extensive experience in Superfund cleanup or at least RCRA hazardous waste management. The fact that they didn't find a better technology does not assure me that one does not exist or soon won't exist.

11. I would like to see the Colorado Department of Health given authority and (where needed) funds to monitor air, water, compliance with approved plans. They should also be able to analyze data, perform public health studies and approve or disapprove all plans and programs which affect public health including the standards for emissions, emergency response plans, evacuation plans and protocol.

12. Once standards are set for the operation of the incinerator, any question of compliance should be taken seriously. There should be redundant mechanisms for automatic shutdown if it appears that it is not operating in compliance. It is better to shut down and have to restart than to allow unauthorized emissions to continue while the situation is being analyzed.

13. Incinerators for the disposal of mixed wastes are notorious for malfunctioning. Maintenance schedules must carefully drawn up with provisions to adjust the schedules if needed to avoid loss of efficiency or production of excessive emissions.

Finally, I feel that information was not given to the public which should have been. One example is the "Draft Public Health Risk Assessment Report on Submerged Quench Incinerator" which was printed on January 20, after the public hearing. I request a separate hearing on that document to be included as part of the public comment on the Proposed Decision Document for the Interim Response Action on Basin F Liquid Disposal.

I also request a Court ruling on the legality of calling this proposed action an Interim Response Action and of rushing it through before other alternatives can be developed.

*Clara Ferrelly 1/20/82*

**RESPONSE TO COMMENTS FROM CLARA LOU HUMPHREY  
ON PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID DISPOSAL**

Comment 1: According to the objectives of this IRA for Basin F liquid disposal, this action is to "select the FINAL TREATMENT PROCESS for Basin F liquid currently stored in tanks and Pond A ." If this is expected to be a final action, why is it being hurried through the process ahead of so many interim actions? Why is it being called an interim action? Why can't it wait until some of the real interim actions have been completed since at least 2 of them were presented as possible pilots for cleanup of Basin F wastes? It would not be appropriate to answer that this response is urgent because the last one which was tried did not work! As I understand it, the word of the "experts" was wrong on the amount of liquid in Basin F, the useful life of the tanks and the effectiveness of the pond as a holding facility until an appropriate final solution can be found. To use the excuse that these decisions proved wrong does not make a valid case for construction of an incinerator which will be vented into the already contaminated air of the Denver area, especially this early in the cleanup process. Please include in your written response proof that the damage being caused by the failure of the existing IRA is a great enough threat to health and the environment to justify building an incinerator (a final solution) before the other IRA's with their pilot potentials have been completed and the data analyzed.

Response: The Basin F liquid IRA is not being hurried by the Army. The On-post Record of Decision is scheduled to be released in late 1993. The organizations and State of Colorado came

to agreement that early action is appropriate for thirteen IRA's. The court concurred with this agreement and it is now part of the Federal Facility Agreement. The Basin F liquid IRA is one of the thirteen IRAs. The other two IRAs you refer to are the M-1 Ponds and Motor Pool where in-situ vapor extraction and in-situ vitrification will be utilized. These technologies are for soils and not appropriate for liquids.

The first phase of the Basin F IRA had as its objectives the removal of liquid from the Basin into storage facilities and the consolidation of the most contaminated soil into a double-lined waste pile. This phase did work and has been completed.

The additional liquid discovered during soil removal was underneath a false basin floor of crystallized sediment. This additional liquid was produced as a result of an unexpected 25-year rainstorm event. It would have been nearly impossible for any one to have predicted that this additional liquid would be entrapped beneath the Basin F sediments. The storage tanks were designed with a 5-year service life based on corrosion allowance. They are not exceeding this corrosion rate and at least the full 5-year service life will be achieved. Pond A is a double-lined holding pond built to RCRA standards. It is not leaking into the environment and typically liner materials such as were used have a guaranteed life of at least 20 years. None of these decisions has proven wrong. The liquids can be safely treated within the service life of the tanks. In hind sight, perhaps a greater storage capacity and longer tank service life should have been designed. However, no one is in imminent danger or risk from storage of Basin F

liquid in Pond A, or by the need to treat liquids in the tanks within the 5-year service life. No damage is being caused by the first phase of this IRA because it did not fail, i.e., the liquid was removed and the most contaminated soils consolidated into a secure wastepile.

The justification for the Basin F liquid incinerator is that it is the best treatment alternative; our preliminary risk assessment showed that it presents an acceptable risk; it results in greatest reduction of mobility, toxicity, or volume; and it can treat the Basin F Liquids within the service life of the storage tanks. The pilot potential of the other IRAs mentioned is for potential treatment of contaminated soils, not liquid. It should be noted that a great benefit to the local Denver environment will be realized through the permanent treatment of Basin F liquid and disposal of residuals in an off-site hazardous waste landfill.

Comment 2: I request that public input be accepted and responded to AT LEAST before the following have been finalized:

Pilot scale/testing

Selection of engineering design package

I would further suggest PUBLIC MEETINGS when construction is beginning. HEARINGS after 6 months of operation, after 12 months of operation and before final plans for closure are made.

Response: Pre-engineering testing will be limited to a predesign test to develop engineering data for optimizing nozzle design and metals control, but will not involve a "pilot-scale test".

The Decision Document text wording has been changed to reflect this. Information from both the predesign test and the design package itself will be available in the implementation document. Public information meetings and briefings will be conducted throughout the Implementation Document development period. Your ideas on timing will definitely be taken into consideration. As a Technical Review Committee member, we suggest you raise these ideas again at a later date closer to the occurrence of these events.

Comment 3: Since on-site incineration has been selected as the technology of choice, special care must be taken to assure protection of health and the environment. People of the Denver area have had a series of waste-disposal processes fail to perform as promised and be shut down soon after becoming operational.

Response: The Army is carefully evaluating the potential effects to human health and the environment from the proposed incinerator. The EPA, Colorado Department of Health, and Shell will be closely monitoring the Army's efforts. The evaluations include two completed human health risk evaluations, a wildlife endangerment assessment (in progress), and a planned human health risk assessment based on full-scale trial burn measured emissions. Based on the operational experiences of SQIs, the Army does not expect a situation similar to your stated concern.

Comment 4: The major assumption which led to the decision to choose an on-site solution seems to be that public trust in technological solutions to technological problems is virtually nonexistent and that off-site facilities could not



be permitted because of public pressure. Due to the failure of so many technological solutions, I must accept this assumption, but it makes it even more important to take your time, conduct pilot projects, further evaluate alternatives and do everything right the first time. Every failed solution in this country has added to your burden of gaining public trust. I suggest that you and your contractors owe it to others faced with superfund cleanup to place caution at the top of your schedule and consider the concerns of the public to be an asset rather than a hindrance to the performance of your task.

Response: The Army places success tempered with caution as our highest technical objective. We do not understand the basis for the commentor's statement that the "major assumption" in the decision was "that public trust in technological solutions to technological problems is virtually nonexistent..." While the statement concerning public trust may be factual, the identification of this as a major assumption is incorrect. The major assumption was that processes needed to be identified with a reasonable chance of successfully completing the remediation within the 5-year service life on the Basin F liquid storage tanks. With regard to the public's confidence, the Army has sought to gain that trust by making the decision process and related information open to the public and by trying to fully respond to the public's questions. The Army will continue to do so.

Comment 5: The appeal of incineration is that it greatly reduces the volume of hazardous waste to be disposed of. Unfortunately, incineration, as you propose it, would result in the releasing of some of that waste into the air. I request that the public and EPA be given the relative costs of your

proposed system and one which would allow no emissions into the air. Although cost must be a factor, I submit that it has been given a higher rank in the decision process than is proper when the waste to be treated has the potential to cause harm to humans, wildlife, and the environment over such a long period of time.

Response: Of the five potential technologies that resulted from a screening and evaluation of all technologies, all five to a degree gave rise to air emission concerns. The costs for all five were provided in the Treatment Assessment Report. In terms of incineration, there are no incineration-type treatment processes that would have absolutely no air emissions. Air emissions are a normal by-product of combustion. The treatment alternatives were evaluated based on the criteria listed in CERCLA Section 121(b) and described in the National Contingency Plan Section 300.430(e). These criteria are listed in Section 3.0 of the Decision Document. The decision was based on consideration of many variations of weighting factors and included a number of scenarios where cost was assigned zero weight or no importance and could not affect the decision. Submerged Quench Incineration was selected primarily because it was the most protective of public health among the proven technologies.

Comment 6: Since the choice of a submerged quench incinerator was based on reports that there are some in operation and that they are able to process the Basin F liquids, a list of those currently in operation and the wastes being treated should have been part of the decision document so that citizens who need reassurance could easily have learned of their "track records". The need of the public is to be reassured.

Reassurance does not come from schematic diagrams, it comes from the experience of others in similar circumstances.

Response: The Army understands your concerns. We provided all the available information in our possession at the public meeting. The operational survey report of all commercially operated SQIs in the United States and Puerto Rico that handle a similar waste material is complete at this time and will be released sometime in March 1990.

Comment 7: The selection of the site, should you decide to go ahead with an incinerator at this time, must consider potential health risks not only to residents of neighborhoods that are adjacent to the Arsenal, but to all people. The effect of the incinerator on Denver's air, on acid rain, on farms and ranches in Colorado and adjacent states, and on the wildlife on the Arsenal must all be considered.

Response: The incinerator site would be selected such that it would provide a maximum protective buffer zone between the process equipment and the neighboring citizens in addition to requiring a low transportation risk to on-site workers. The effect of the incinerator on air quality and wildlife have already been evaluated in the context of the Public Health Risk Assessment and EPA evaluation criteria.

Comment 8: On page 6-1 the statement is made that "a pilot test has already been conducted using a Submerged Quench Incinerator to destroy Basin F liquid, at a scale of operation that minimizes the need for a subsequent pilot test to develop scale-up design data. The IRA could proceed directly to scale-up and the design process." It would be inappropriate to rely on data gathered at this stage for the pilot test.

Another set of tests must be done as part of this action, preferably by another party, in light of the change in the purpose for the tests. The tests for feasibility can be used for baseline data against which the pilot tests can be compared. Since time has passed since the first tests, it is important to have the liquids to be tested drawn from all three containers and the pond as well as from a variety of depths in each. It should cost less to properly test than to have to close down the plant because of a surprise!

Response: Additional predesign testing is planned utilizing the SQI technology to ensure, to the maximum extent possible, that there will be no surprises. The Basin F liquid is sampled on a quarterly basis and these results will be used in the full-scale design effort.

Comment 9: Since at least one alternative to incineration has been suggested by the Colorado Department of Health (Super Critical Water Oxidation) and since you are proposing a final, and not an interim action, you should consider this alternative as well as others which may be "on the shelf" within the next few years. Basin F liquids have been contained temporarily to buy time to find the best possible solution. Take advantage of that opportunity.

Response: The Army has already considered super critical water oxidation (SCWO) for Basin F liquid. The Army has met with manufacturers and suppliers of the technology and has determined that this equipment provides no opportunity for remediation of Basin F liquid. First, there is no pilot-scale or full-scale SCWO equipment in operation or available for testing anywhere in the world. Second, the suppliers are unable to provide the level of testing required on the

## Woodward-Clyde Consultants

only small-scale apparatus they possess. And third, the manufacturers would be unable to engineer and manufacture the first full-scale piece of SCWO equipment in the time frame of this IRA. Also, SQI has been conditionally recognized by the EPA and Colorado Department of health as the best alternative for treatment of Basin F liquid within this IRA timeframe.

Comment 10: According to the "Proposed Decision Document for the IRA", several important mistakes were made by Woodward-Clyde Consultants and corrected in the process of developing this document. Perhaps another consultant should be used for future work, one which is familiar within the guidelines and which has had extensive experience in superfund cleanup or at least RCRA Hazardous Waste management. The fact that they didn't find a better technology does not assure me that one does not exist or soon won't exist.

Response: The comment does not identify any specific mistakes, but the Army surmises that the comment refers to sections 4.1.1 and 4.2.2, wherein numerous treatment alternatives and treatment technologies are described. The Decision Document narrates how these alternatives and technologies were identified, evaluated, and discarded as infeasible, resulting in a very small set of feasible alternatives that were retained for further analysis. Perhaps the reader interpreted these sections to describe a series of "mistakes", in which alternatives or technologies were pursued and then found to be unacceptable. Such an interpretation was not intended and is incorrect. The search for feasible technologies and treatment alternatives was consistent with EPA guidance on remedy selection, and reflects a "leave no stone unturned" philosophy. The results of this search, five feasible

## Woodward-Clyde Consultants

technologies and a handful of treatment alternatives, derive from a process of elimination that took place over several years, and involved the research efforts of the Army, EPA, Shell and several other consultants.

Woodward-Clyde is a large, nationally prominent professional services firm with practice in engineering and environmental sciences. The firm has been a contractor to the EPA for Superfund cleanup programs since the inception of the Superfund program. Woodward-Clyde has conducted hundreds of RCRA permitting assignments, and is a contractor to the EPA on its Combustion Research Facility, which is the incineration test facility that provides basic data to support RCRA regulation of incinerators by the EPA. Moreover, the Army will use many resources to design, construct, and operate this IRA and will not rely solely on Woodward-Clyde Consultants.

Comment 11: I would like to see the Colorado Department of Health given authority and (where needed) funds to monitor air, water, compliance with approved plans. They should also be able to analyze data, perform public health studies and approve or disapprove all plans and programs which affect public health including the standards for emissions, emergency responses plans, evacuation plans and protocol.

Response: The Colorado Department of Health (CDH) has been invited to be involved in review of the development of the Implementation Plan and performance monitoring of the remedial operation. CDH has expressed a commitment to actively participate in the planning and development of this IRA. The Army and EPA are actively discussing staffing needs with CDH.

Comment 12: Once standards are set for the operation of the incinerator, any question of compliance should be taken seriously. There should be redundant mechanisms for automatic shutdown if it appears that it is not operating in compliance. It is better to shut down and have to restart than to allow unauthorized emissions to continue while the situation is being analyzed.

Response: The Army has agreed to follow EPA guidance for hazardous waste incinerators throughout this project. This guidance outlines the mechanisms for automatic system shutdown in the event of noncompliance operation. These mechanisms will be finalized during the design process and presented in the Draft Implementation Document.

Comment 13: Incinerators for the disposal of mixed wastes are notorious for malfunctioning. Maintenance schedules must be carefully drawn up with provisions to adjust the schedules if needed to avoid loss of efficiency or production of excessive emissions.

Response: The Army agrees that maintenance schedules must be developed around specific operations and wastes to avoid loss of efficiency and production of excessive emissions. The Army has committed to develop procedural controls that will ensure that the incinerator operates within design limits (avoidance of loss of efficiency) and has committed to develop operational and procedural controls to ensure that the incinerator will operate in accordance with standards and operating requirements (avoidance of excessive emissions). These commitments are expressed in Chapter 6 of the Decision Document.

For the record, however, none of the wastes at RMA are "mixed wastes" (by EPA definition). Basin F liquid is a chemical hazardous waste. The Army does not believe that credible evidence exists to support the assertion that chemical hazardous waste incinerators are notorious for malfunctioning. Chemical hazardous waste incinerators are in wide use by industry throughout the United States, and have a very good record for safe operation. Submerged quench incinerators (the proposed treatment described in the Decision Document) have a nearly flawless record in the United States.

Comment 14: Finally, I feel that information was not given to the public which should have been. One example is the "Draft Public Health Risk Assessment Report on Submerged Quench Incinerator" which was printed on January 20, after the public hearing. I request a separate hearing on that document to be included as part of the public comment on the Proposed Decision document for the Interim Response Action on Basin F Liquid Disposal.

Response: The Army expects to receive comments on the Public Health Risk Assessment and will continue to accept them beyond January 1990. The risk assessment report is more properly a part of the Implementation Document process, not the Decision Document Process. The Public Health Risk Assessment is available in the JARDF, and all comments received on this risk assessment will be addressed in the Implementation Document. The Army will continue its efforts to involve the public throughout the IRA process. The Public Health Risk Assessment was based on the monitoring data collected during the T-Thermal SQI testing, except



where the data were questionable. In those instances, conservative data were used to estimate the maximum possible health risk. The risk assessment did not show a change in public risk over that estimated by using process efficiencies and hence did not affect the selection of SQI. The purpose of the risk assessment, based on the monitoring data already collected, was to identify risk elements and thereby begin the design process in terms of setting design goals for further reducing public risk. The risk assessment results will be factored into the design of the actual SQI unit so that public safety can be assured.

The Army has committed to an open design process. As part of that open design process, the Army released the risk assessment as it became available. It was not part of the Decision Document, even though it was issued during the comment period. Both Shell and the Colorado Department of health have provided comments on the risk assessment to the Army. As a member of the Technical Review Committee, you are also welcome to provide comments on the risk assessment to the Army. Comments received will be considered during the design process. The Army will continue to release documents to the public as they become available because it provides the most "timely" access possible.

Comment 15: I also request a Court ruling on the legality of calling this proposed action an Interim Response Action and of rushing it through before other alternatives can be developed.

Response: The Basin F liquid treatment IRA is the result of several years of study. It was included in the IRAs listed in a report to the Court filed in June 1987, a Proposed Consent

## **Woodward-Clyde Consultants**

Decree filed on February 1988, a modified proposed Consent Decree filed on June 1988 and the Federal Facility Agreement signed in February 1989.

APPENDIX A.9  
CAROLYN G. HICKS - COMMENTS AND RESPONSE

---

A.9-1

*Received 1/29/90*

120 Plutus Drive  
Black Hawk, CO 80422  
January 25, 1990

Mr. Don Campbell  
Deputy Program Manager  
Rocky Mountain Arsenal  
Commerce City, CO 80022-2180

Re: Comments on "Final Treatment Assessment Report, Task IRA-2  
Basin F Liquid Treatment Design"

Dear Mr. Campbell:

I reviewed the Basin F Treatment Report, and have a few comments. My background is in Chemical Engineering, and I worked at the Basin F Interim Storage facilities last year as an employee of Weston.

1. I support the proposed Submerged Quench Incineration on site. In general, I view incineration as a viable method for destroying waste organics and avoiding future liability for the wastes. Final acceptance of an incinerator at the Arsenal would set a positive precedent for other Colorado facilities proposing incineration (such as Rocky Flats).

2. What is planned if large quantities of settled solids are present in the bottom of the storage tanks and Pond A? This seems a likely possibility. I believe I read in your report or one of the appendices that some of the drums of Basin F liquid sent to T-Thermal for a treatability study were found to be half full of solids. It would be advantageous if the final treatment selected can handle solids as well as liquids.

3. The thermal treatment option that produced a vitrified glass matrix was ranked low because it had only been tested with solid/liquid mixes and may not be appropriate for liquids only. Has any consideration been given to treating the Basin F sludges and solids currently stored in the Waste Pile together with the liquids? I realize you may be considering these wastes separately, but if a technology exists that works better on solids and liquids combined, perhaps it should not be ruled out.

4. Are the treatment options for Basin F liquid being evaluated independently from other ongoing cleanup operations at the Arsenal? A cost and resources savings could be realized by selecting a treatment that would be appropriate for more than one waste type, although perhaps with some modifications required.

Mr. Don Campbell

page 2

5. The risk assessment included in the report only calculated risks based on normal operating conditions for each process. I hope that during the final design of the treatment option selected, a risk analysis will be done for upset conditions and credible accidents. Such an analysis must surely include the possibility of a plane crash into the facility, due to the location under the end of the main north-south runway at Stapleton.

I wish you success with whatever option is chosen, and I will be watching for future opportunities to review and comment on the plans.

Sincerely,

*Carolyn G. Hicks*

Carolyn G. Hicks

**RESPONSE TO COMMENTS OF CAROLYN G. HICKS  
ON PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID DISPOSAL**

Comment 1: I support the proposed Submerged Quench Incineration on site. In general, I view incineration as a viable method for destroying waste organics and avoiding future liability for the wastes. Final acceptance of an incinerator at the Arsenal would set a positive precedent for other Colorado facilities proposing incineration (such as Rocky Flats).

Response: The Army appreciates this expression of support.

Comment 2: What is planned if large quantities of settled solids are present in the bottom of the storage tanks and Pond A? This seems a likely possibility. I believe I read in your report or one of the appendices that some of the drums of Basin F liquid sent to T-Thermal for a treatability study were found to be half full of solids. It would be advantageous if the final treatment selected can handle solids as well as liquids.

Response: A feed system design which incorporates recirculation, suspension, jet mixers or other means will be evaluated in the design phase. This will allow all residue that can be dissolved from cleaning the three tanks and surface pond now holding the liquid to be fed to the SQI. Any residue or crystals which remain insoluble and cannot be fed to the SQI will be addressed by the final Record of Decision or an additional IRA phase, if necessary.

Comment 3: The thermal treatment option that produced a vitrified glass matrix was ranked low because it had only been tested with

solid/liquid mixes and may not be appropriate for liquids only. Has any consideration been given to treating the Basin F sludges and solids currently stored in the Waste Pile together with the liquids? I realize you may be considering these wastes separately, but if a technology exists that works better on solids and liquids combined, perhaps it should not be ruled out.

Response: The Federal Facility Agreement which governs all remediation activities at RMA has defined Basin F liquid remediation as an Interim Response Action to be performed now, separately from solids remediation which will be addressed after 1993 in the overall RI/FS for the site. Hence processes which functioned only on, or better on, solids and liquid mixtures were inappropriate for this IRA.

Comment 4: Are the treatment options for Basin F liquid being evaluated independently from other ongoing cleanup operations at the Arsenal? A cost and resources savings could be realized by selecting a treatment that would be appropriate for more than one waste type, although perhaps with some modifications required.

Response: Please refer to the response given to Comment 3 above.

Comment 5: The risk assessment included in the report only calculated risks based on normal operating conditions for each process. I hope that during the final design of the treatment option selected, a risk analysis will be done for upset conditions and credible accidents. Such an analysis must surely include the possibility of a plane crash into the facility, due to the location under the end of the main north-south runway at Stapleton.

Response:       The Implementation Document for this IRA will include a System Safety Hazard Analysis review addressing responses to both process related failure modes and outside catastrophic events.



APPENDIX A.10  
RANDY KEOUGH, GENERAL COUNSEL, VITRIFICATION TECH. - COMMENTS AND RESPONSE

A.10-1

Received 31 JAN 90  
DC

January 29, 1990

Program Manager for Rocky Mountain Arsenal  
Building 111  
Attention: Mr. Donald Campbell  
Rocky Mountain Arsenal  
Commerce City, CO 80022-2180

RE: Interim Response Action/RMA/CERCLA Liquid Wastes

Dear Sir:

This letter will set forth my comments to the Proposed Decision Document for the Interim Response Action, Basin F Liquid Disposal, Rocky Mountain Arsenal, December, 1989 (Draft Final). I am in agreement with Woodward-Clyde Consultants' (Consultants) recommendation that a newly-constructed, on-site facility is the best method for dealing with the subject wastes; however, I do not agree with the choice of submerged quench incineration as the preferred technology to be employed at said facility. It appears that the Consultants' analysis of the electric melter furnace technology is inaccurate in light of recent developments in this area. I would like to relay information that demands a reassessment of this technology.

I will set forth a number of claims based on the attributes of Vitrification Technologies Inc.'s (VTI) electric melter furnace (EMF) which should reasonably cause the reevaluation of this technology and a recommendation of the EMF as the preferred alternative for treating Basin F liquids, sludges and soils (and possibly a host of other contamination problems).

1. VTI's EMF is designed to operate at approximately 3200 degrees F which assures greater destruction of organic compounds and also reduces energy demand due to increased conductivity in molten glass at higher temperatures.
2. Molten salts will not float on the top of a pool of glass in VTI's EMF. Instead, the contaminants will integrate with the glass and become encased therein which will eliminate the need to dispose of certain hazardous residuals.
3. VTI's EMF comprises a "closed-loop" system and eliminates the need for expensive air pollution control equipment and the importation of anhydrous ammonia and sodium hydroxide.

4. Disposal of glass-encased metals or other hazardous elements or compounds may be accomplished on-site eliminating associated transportation costs and the potential for subsequent leeching.

5. Costs of construction and operation of VTI's EMF are substantially lower than the estimated project cost of \$21.1 million set forth in the Proposed Decision Document. Two VTI EMFs with nearly twice the through-put capacity of the recommended submerged quench incinerator could be constructed and operated for approximately one-half the estimated project cost.

6. VTI's EMF design drastically reduces "down-time" typically experienced with incinerators and other EMFs, thus improving treatment efficiency.

7. EMFs are much safer for workers and the public as opposed to incinerators since combustion is not involved.

8. Finally, and most importantly, VTI's EMF has the ability to process, concurrently, Basin F liquids, sludges and soils.

I do not believe that you can proceed responsibly with this IRA without evaluating the claims I have made above.

You may contact me at 322-7714 by phone or 1625 Downing Street, Denver, CO 80218 by mail.

Thank you for your attention to this matter and I look forward to meeting with you.

Sincerely,



Vitrification Technologies Inc.  
Randy Keough, General Counsel



DEPARTMENT OF THE ARMY  
PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL  
COMMERCE CITY, COLORADO 80022-2180



REPLY TO  
ATTENTION OF:  
Interim Response Division

Mr. Randy Keough  
General Counsel  
Vitrification Technologies, Inc.  
123 Ivanhoe Street  
Denver, Colorado 80220

Dear Mr. Keough:

This letter is in response to your comments on the Basin F Liquids Proposed Decision Document, December 1989.

We concur with your comment that molten glass has a higher electrical conductivity at higher temperatures, which would be expected to decrease consumption of electric power. However, higher temperatures also increase energy consumption due to sensible heat increase of: 1) the off gases and 2) the molten solids. We disagree with the assertion that an operating temperature of 3200 degrees Fahrenheit assures greater destruction of organics. It is known that residence time and degree of mixing (turbulence) are at least as important as temperature in achieving efficient destruction of organic compounds. Past operational experience has shown that the mixing efficiency in Electric Melter Furnace (EMF) is poor compared to that in a properly designed incinerator.

Basin F liquid is comprised of approximately 25 percent inorganic salts. While it is conceivable that the salts in Basin F liquid may be incorporated into a vitrified glass matrix by the EMF process, it must be recognized that the Basin F liquid itself contains no appreciable amount of glass forming material. Further, the salts will not be miscible with glass in all proportions. Unless the proportion of glass formers (such as silica) to salts is large, two molten phases will form in the EMF. It would be necessary to add glass forming materials to the Basin F liquid feed in enormous amounts to produce a single-phase glass with acceptable mechanical and chemical properties. We considered the addition of glass formers to the Basin F liquid feed to be unfeasible for three reasons: 1) total volume of residual material for disposal would increase many times, 2) substantial increase in size and energy consumption would result with the EMF process, and 3) costs associated with the purchase of glass forming material would be high. It was decided that the most effective EMF evaluation for Basin F liquids would be with no addition of glass formers; thus, the process residual would be solid salts. The Basin F Liquids Final Treatment Assessment Document, December 1989, describes the evaluation process in more detail.

You further state in your letter that the operation of the EMF would "eliminate the need to dispose of certain hazardous residuals". By certain hazardous residuals, we understand you to refer to either incinerator ash or solid salts produced by the EMF process. In either case, it must be pointed out that the glass produced by the EMF process would receive the same regulatory scrutiny prior to disposal as that of other process residuals. Whether such residuals would be more acceptable to regulators depends on the physical and chemical characteristics of the glass matrix.

Later in your letter, you stated: Vitrification Technologies, Inc. (VTI), EMF comprises a "closed-loop" system and eliminates the need for expensive air pollution control equipment and the importation of anhydrous ammonia and sodium hydroxide. This implies that control of particulates, mists and aerosols (produced by very high temperature combustion of organics, fusion of inorganics and evaporation of water), as well as control of acid gases is accomplished by VTI's EMF without use of air pollution control equipment. It is not plausible that chlorine, hydrochloric acid, and sulfur and nitrogen oxides may be captured and retained in a 3200 degree Fahrenheit molten glass. Your analysis apparently does not take into account the 10 percent nitrogen in Basin F liquid. It appears likely that the same mechanism which accounts for destruction of organic compounds (high temperature oxidation) would also produce oxidation of nitrogen compounds (and atmospheric nitrogen in the air feed) to nitrogen oxides. The function of the ammonia that is referred to in your statement is to chemically reduce the nitrogen oxides to nitrogen. The Treatment Assessment Document has more details on this.

It is accurate to say that disposal of EMF residuals on-site eliminates associated transportation costs, but the on-site disposal of "glass-encased metals or other hazardous elements or compounds" does have the potential for leaching of hazardous constituents out of the glass matrix. As previously mentioned, the physical and chemical characteristics of the glass matrix depend on the proportion of glass to salt and the composition of the salt. It is entirely possible to produce a vitrified glass matrix from which unacceptable leaching of heavy metals may occur.

As previously mentioned, the capacity of an EMF operated in the glassifying mode needs to be much higher than that required of an EMF operated in salt production mode (which was considered in the Treatment Assessment Document) for the same throughput of Basin F liquid. It is, therefore, unlikely that the economics are as favorable as stated in the your comments when the lack of glass forming material in Basin F liquid is considered.

It should be recognized that cost was one of many evaluation criteria considered in evaluation of treatment options. A list of the evaluation criteria is specified in the Treatment Assessment Document. A few of these criteria are: protectiveness of environment, nearby residents, and operating personnel; effectiveness of destruction of hazardous constituents; and technical maturity. Additionally, a sensitivity analysis was performed on the treatment option assessments. This analysis involved changing the weights associated with the importance of each criterion and elimination of the criterion

altogether. As an evaluation criterion, cost was found to have minor effect on the results of the treatment option assessments. The Treatment Assessment Document has additional information on the evaluation process.


We disagree with your statement: VTI's EMF design drastically reduces "down-time" typically experienced with incinerators and other EMF's, thus improving treatment efficiency. It is possible that VTI may have an equipment configuration which results in superior down-time performance. The reduction of down-time does not necessarily result in increased treatment efficiency, since the only pertinent measure of treatment efficiency is destruction or immobilization efficiency for hazardous constituents. The VTI's EMF is apparently unproven in this regard. We consider down-time performance to be an economic concern of which was taken into account in the treatment assessment evaluation.

Your comment that the EMF is safer for workers and the public as compared to incinerators since combustion is not involved is not plausible. In your letter, you assert that combustion of organic compounds in the EMF does not take place. This is inaccurate, since the alternative to high temperature oxidation of organic constituents (combustion) would be high temperature destruction of organic constituents in the absence of oxygen (pyrolysis). Pyrolysis of organic constituents results in products which are often more toxic than the compounds which were destroyed. It is technically impossible at these temperatures for VTI's EMF to operate under neither of these conditions.

Your final comment that VTI's EMF has the ability to process, concurrently, Basin F liquids, sludges and soils is correct. As stated explicitly in the Treatment Assessment Document, the preferred mode of operation for the EMF was with concurrent feed of Basin F liquids and contaminated soils. The Federal Facility Agreement, however, voluntarily and jointly entered into by the Army, Shell, and the Environmental Protection Agency, specifies a time schedule for implementation of the Basin F liquid Interim Response Action. Unfortunately, the schedule time constraints do not allow concurrent treatment of Basin F liquids and contaminated soils.

The Army appreciates the comments and information that you have provided. We have fully considered and addressed them in preparing the draft final decision document.

Sincerely,

  
Donald L. Campbell  
Deputy Program Manager

Enclosure

APPENDIX A.11  
HANNA R. SCHULEWSKI - COMMENTS AND RESPONSE

---

A.11-1

To whom it may Concern; Jan 18, 1990  
Dear Mr. Campbell  
Re Incineration at Arsenal

Please accept the expression  
of my deepest concern about  
the possible incineration of  
toxic wastes from basin F.

Not only do people live too  
close to this dangerous proce-  
dure; emissions will blow  
directly into the Denver in-  
version bowl and be carried  
up and down the Front Range  
Colorado's most populated  
area. Even if Carbon Mono-  
xide were controlled, many  
other hazards will escape  
the stack, for which no  
standards exist and the  
adverse results to people's  
health is not even known!

The Front Range air needs  
to be improved; please don't  
contribute to its further de-  
terioration! Thank you!

Sincerely,

Hanna R. Schulewski

Hanna R. Schulewski  
901 Sherman Street Apt. 621  
Denver, CO 80203



RESPONSE TO COMMENTS OF HANNA R. SCHULEWSKI  
ON PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION, BASIN F LIQUID DISPOSAL

Comment: Re: Incineration at Arsenal

Please accept the expressions of my deepest concern about the possible incineration of toxic wastes from Basin F.

Not only do people live too close to this dangerous procedure; emissions will blow directly into the Denver inversion bowl, and be carried up and down the Front Range, Colorado's most populated area. Even if Carbon Monoxide were controlled, many other hazards will escape the stack for which no standards exist and the adverse results to people's health is not even known!

The Front Range air needs to be improved; please don't contribute to its further deterioration!

Response: Please refer to copy of letter sent to Ms. Schulewski.



DEPARTMENT OF THE ARMY  
PROGRAM MANAGER FOR ROCKY MOUNTAIN ARSENAL  
COMMERCE CITY, COLORADO 80022-2180



REPLY TO  
ATTENTION OF:  
Interim Response Division

Ms. Hanna R. Schulewski  
901 N. Sherman Street, Apt. 621  
Denver, Colorado 80203

Dear Ms. Schulewski:

I want to thank you for the time you took to express your concerns about the incineration of Basin F liquid. I will do my best to address them and explain how your concerns and those expressed by others have been and will continue to be incorporated into the way the Army will design and operate a submerged quench incinerator for Basin F liquid.

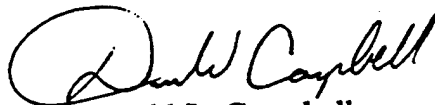
One of the first issues we had to deal with in terms of treating Basin F liquid was the issue of on- or off-site treatment. We also would prefer that toxic wastes such as Basin F liquid did not exist at Rocky Mountain Arsenal with its close proximity to the Denver Metro Area. Unfortunately, the Basin F liquid is a remnant of past Arsenal operations which must be dealt with in the next several years. We were faced with the alternative of treating the liquid in a remote location on the Arsenal or transporting it along existing rail lines through nearby population centers. I assure you that the lowest total health risk is an on-site treatment. Further, by law, on-site treatment of hazardous waste is preferred over off-site disposal of untreated wastes. Tests prove that the best and safest method for on-site treatment of Basin F liquid is the submerged quench incineration process.

In regard to your concerns about carbon monoxide and other potential emissions, it may ease your worries somewhat to know that the Environmental Protection Agency (EPA), Region VIII, also approached us about total emissions. The EPA requested that the Army address total emissions when designing and operating this system. Therefore, the Army promised in the Basin F Decision Document that no incineration will be allowed under the present Decision Document unless it can meet EPA standards for total emissions.

I must agree that any new emission source has some impact on the Front Range air quality. However, the temporary incineration process will only have a minor impact, if any, on regional air quality. In order to put matters in perspective, I have attached charts circulated at the recent public meeting on this project which compare the anticipated emissions from incineration to other common air pollution sources which are probably familiar to you.

Given the comparatively small impact of this project, I would hope that you would agree that treatment of the Basin F liquid will yield a clear and significant benefit to the overall quality of the environment in the Front Range.

Sincerely,

A handwritten signature in dark ink, appearing to read "Donald L. Campbell". The signature is fluid and cursive, with a large initial "D" and "C".

Donald L. Campbell  
Deputy Program Manager

Enclosure